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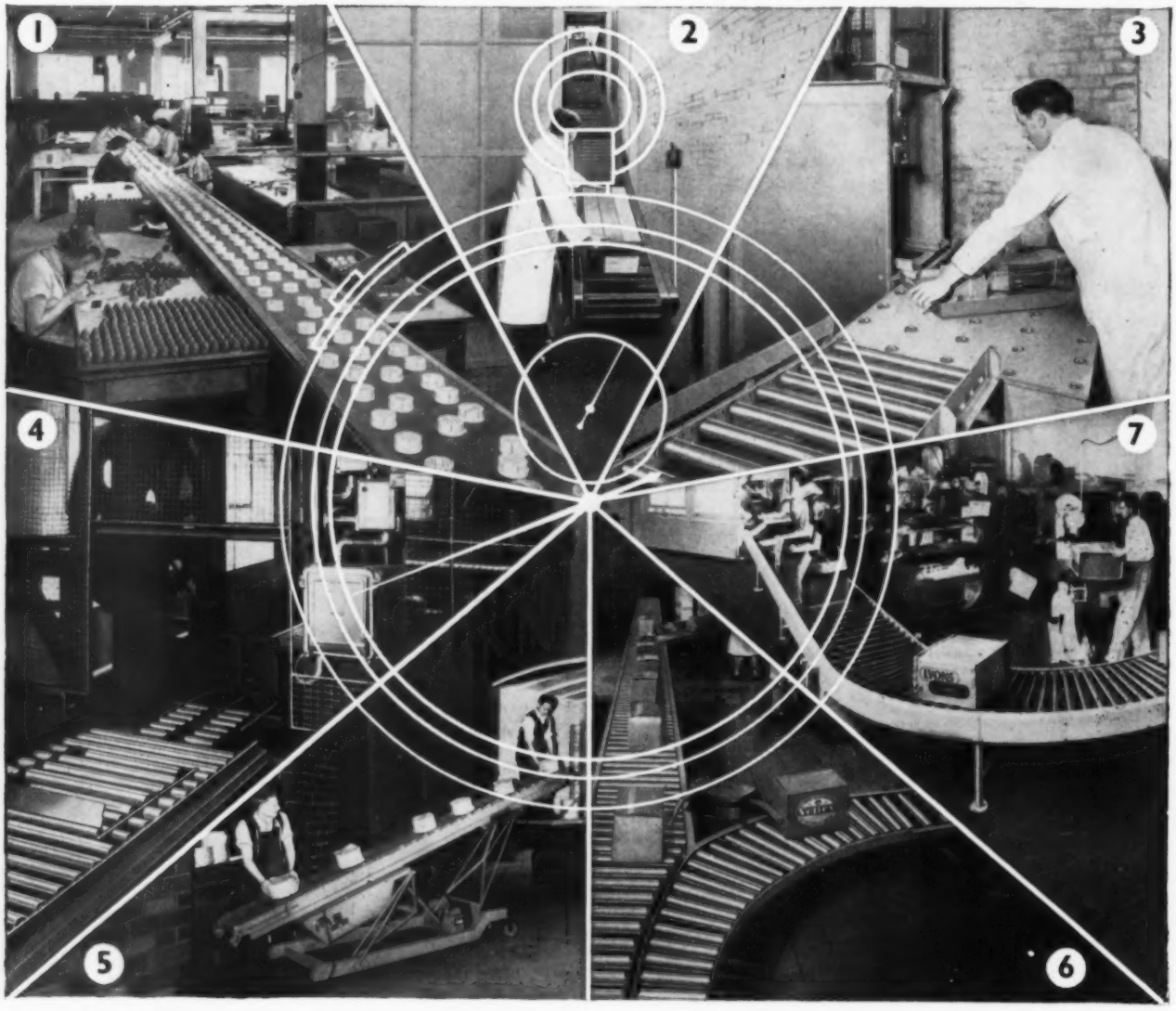

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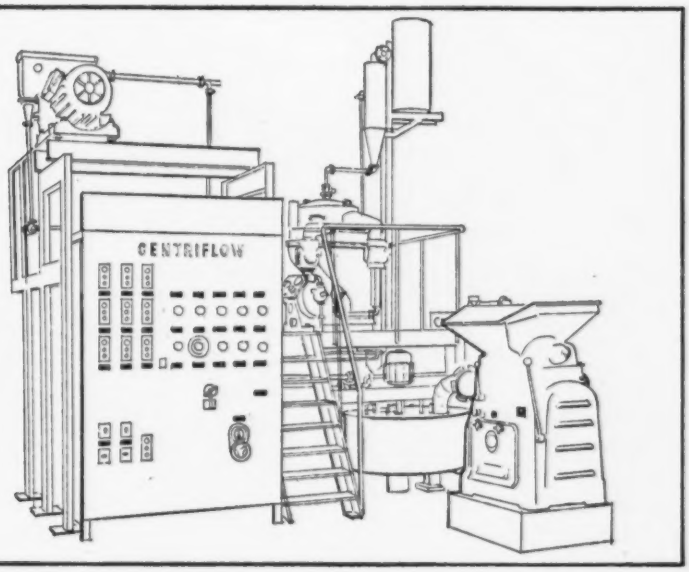

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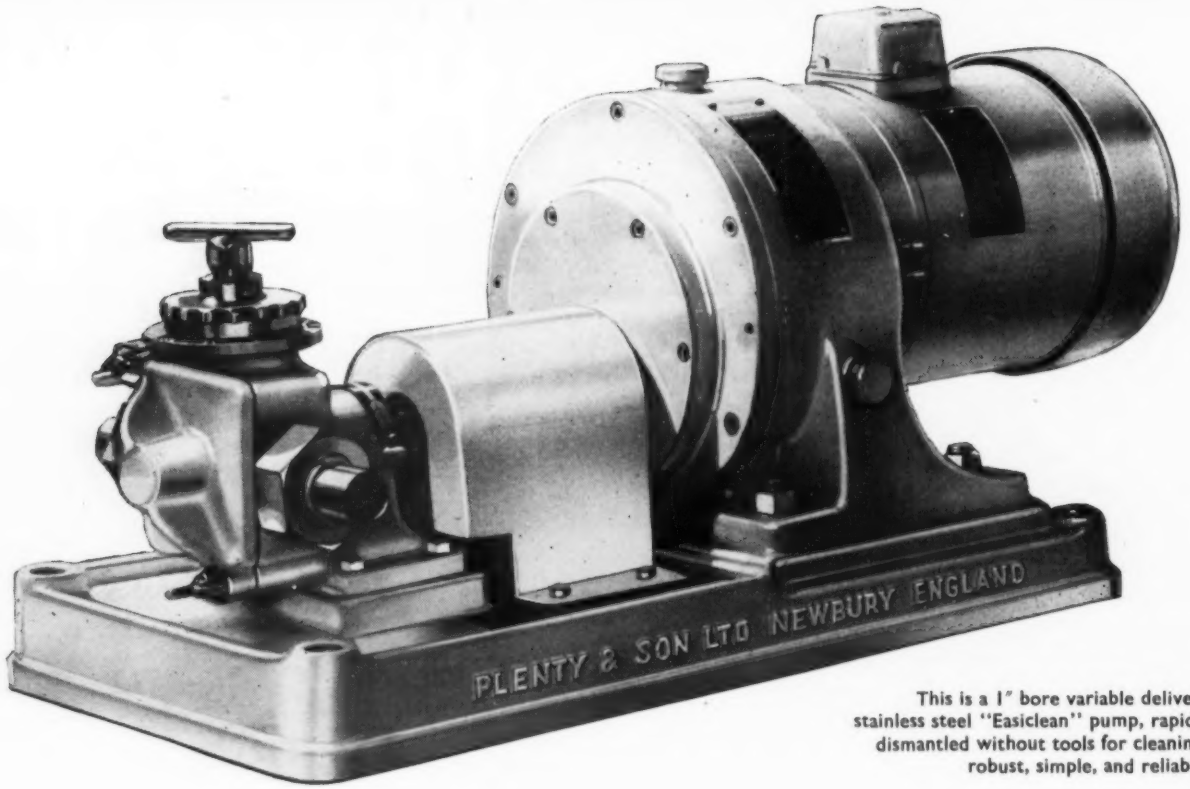

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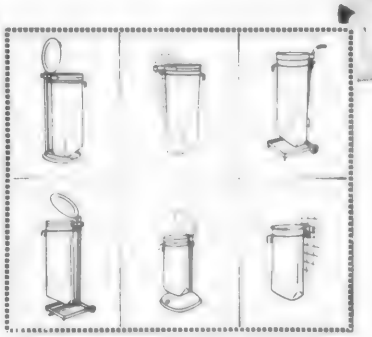

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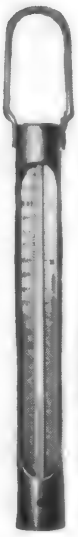
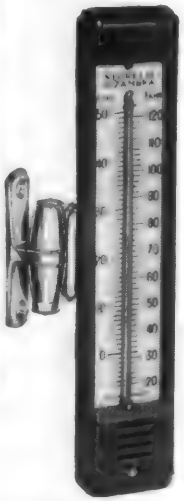


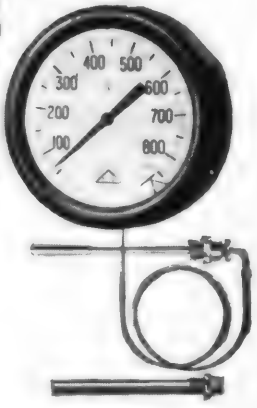
Dipping Thermometer
for hot water, etc.



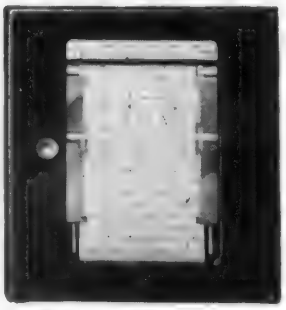
Room Thermometer
with plastic case

Brass-cased Tank and
Pipe Thermometer

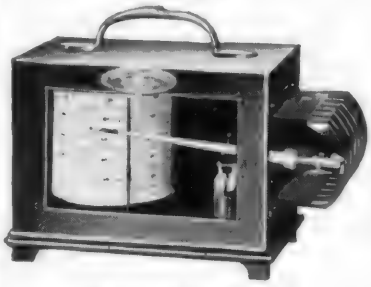
4″ Mercury-in-steel
Dial Thermometer,
Rigid Stem Type



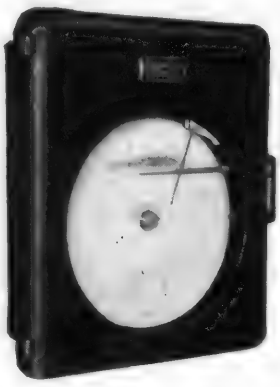
Distance-type Mercury-in-
steel Dial Thermometer



Resistance Thermometer
Recorder



Bi-metallic Recording
Thermometer



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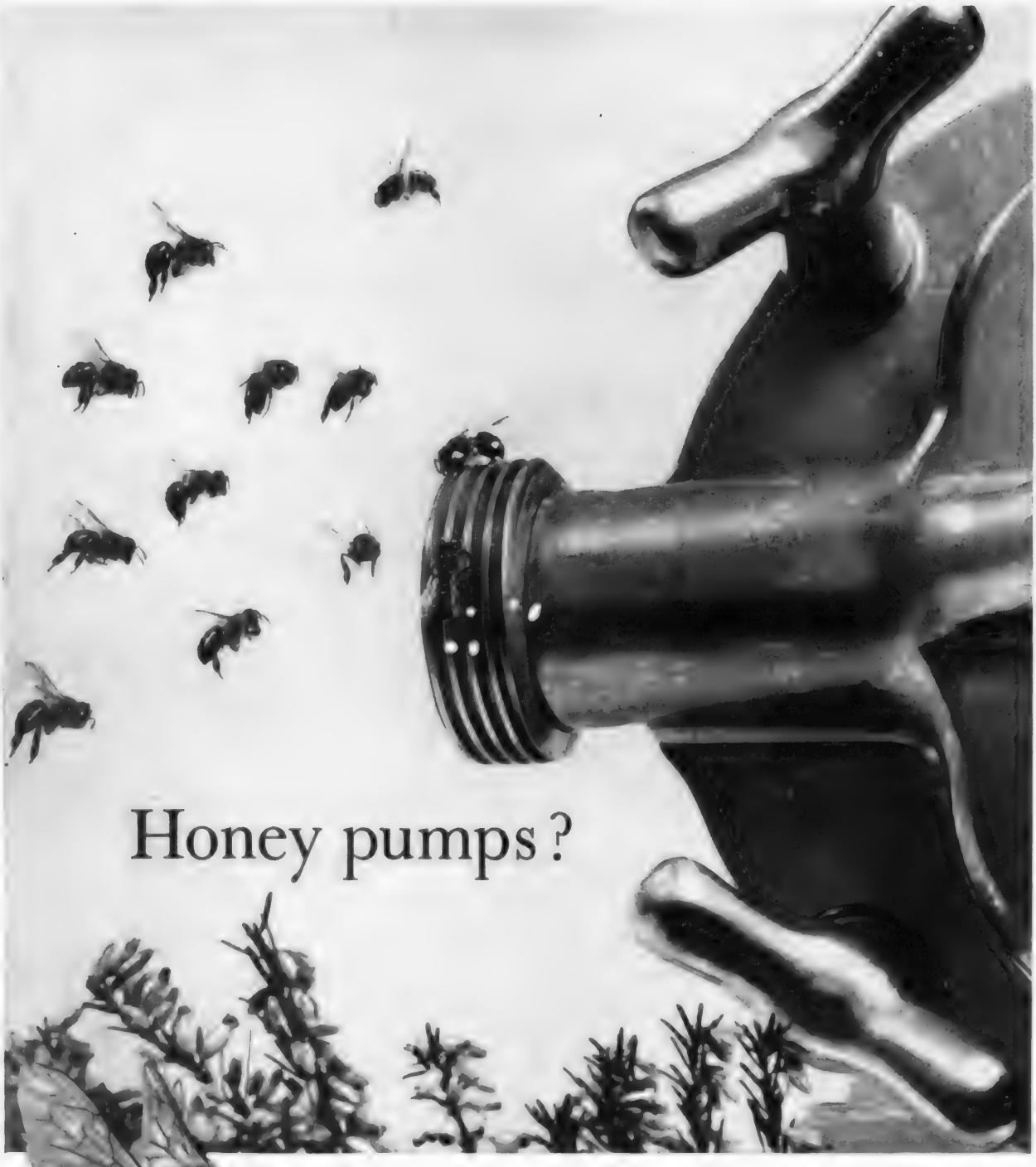

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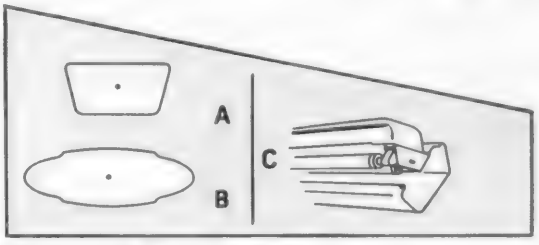

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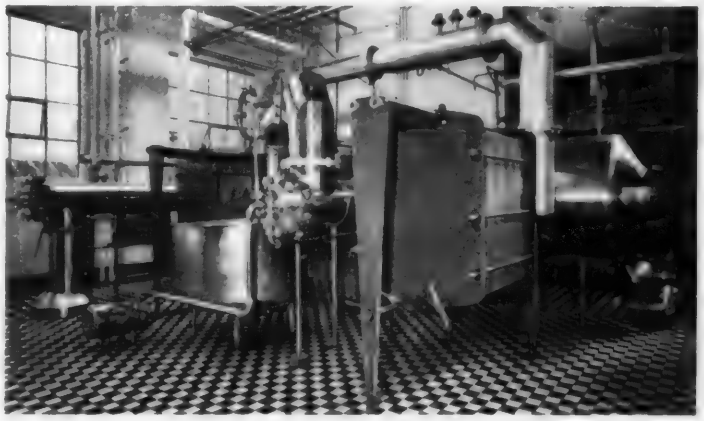

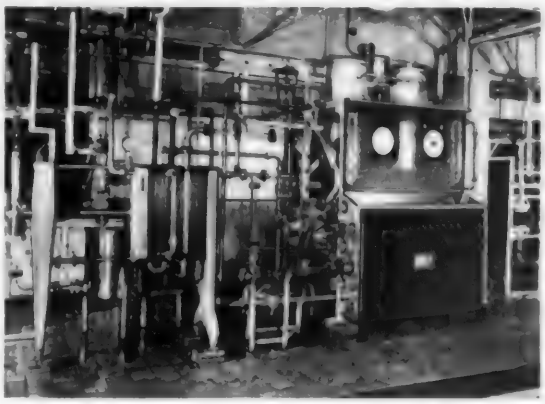

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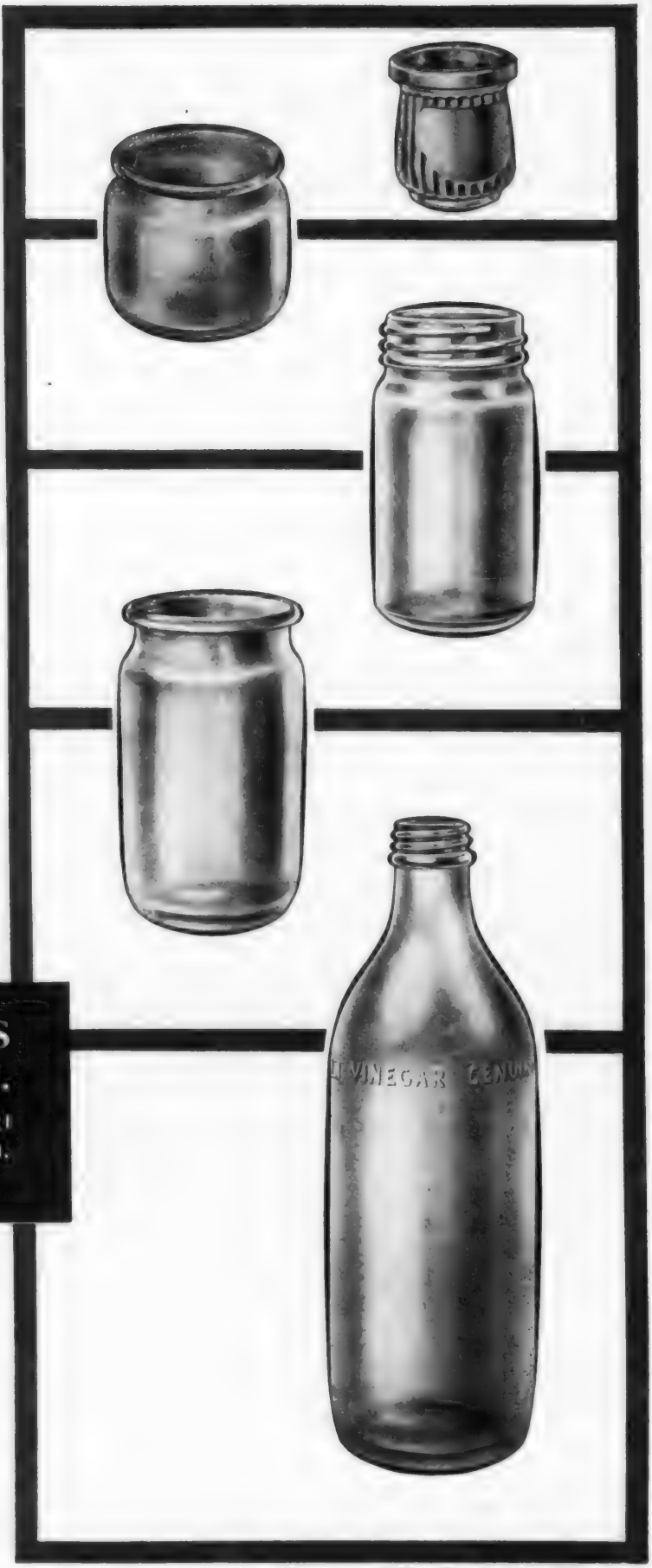

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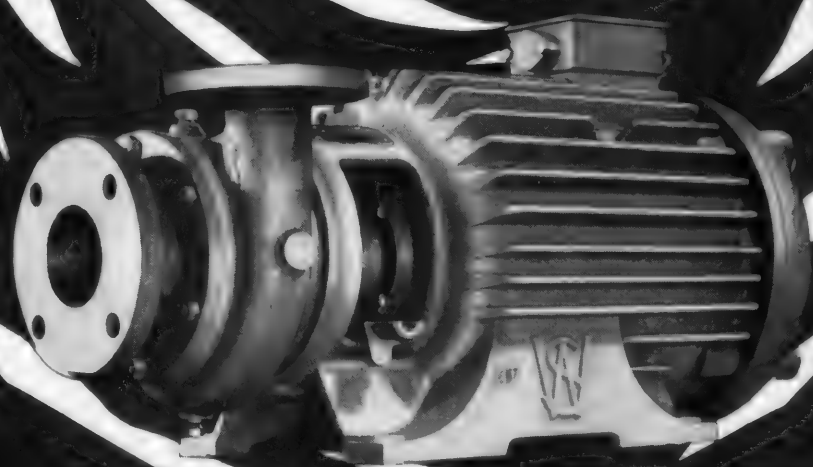

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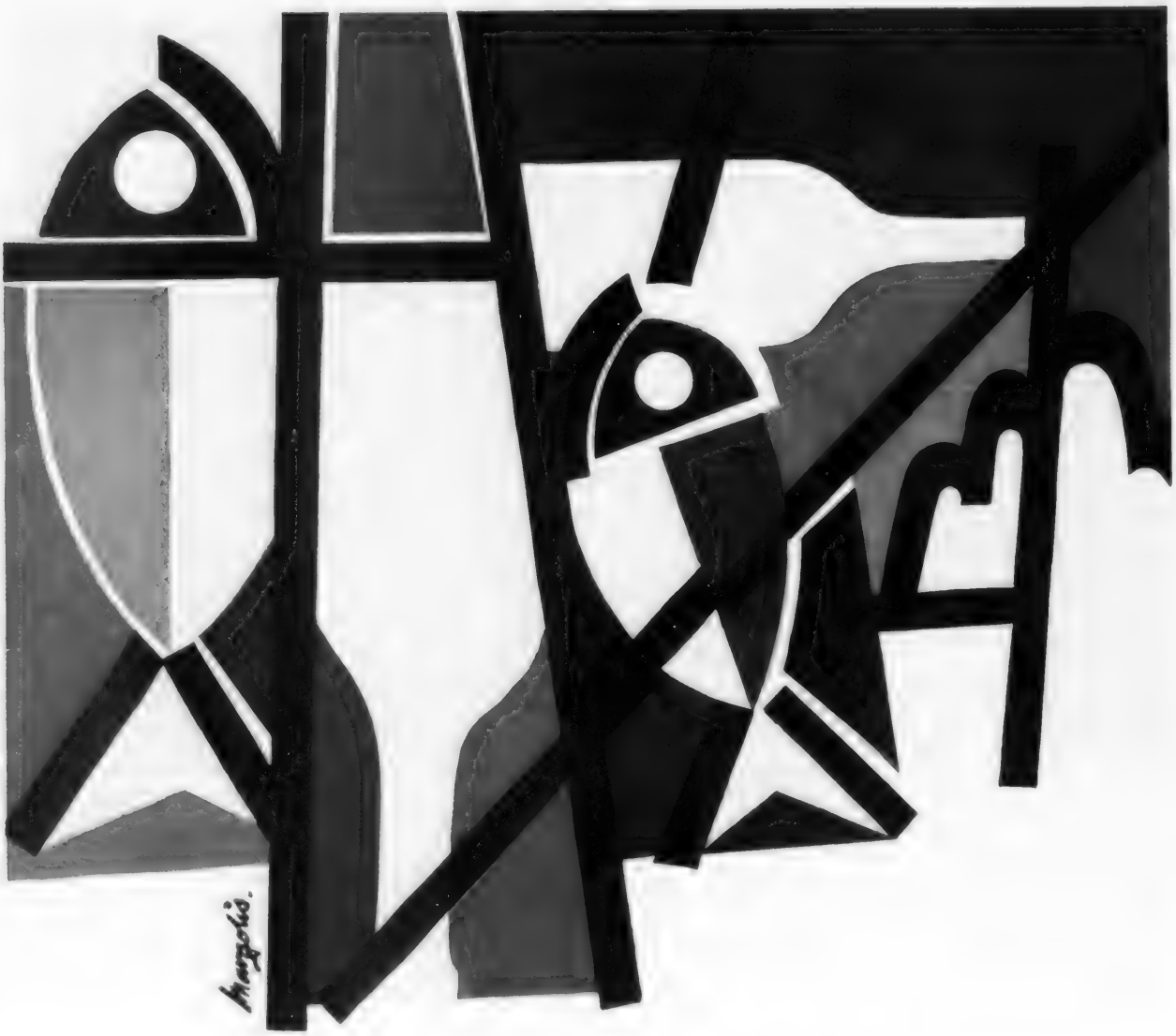

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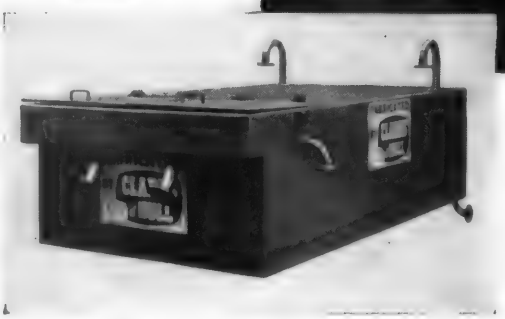

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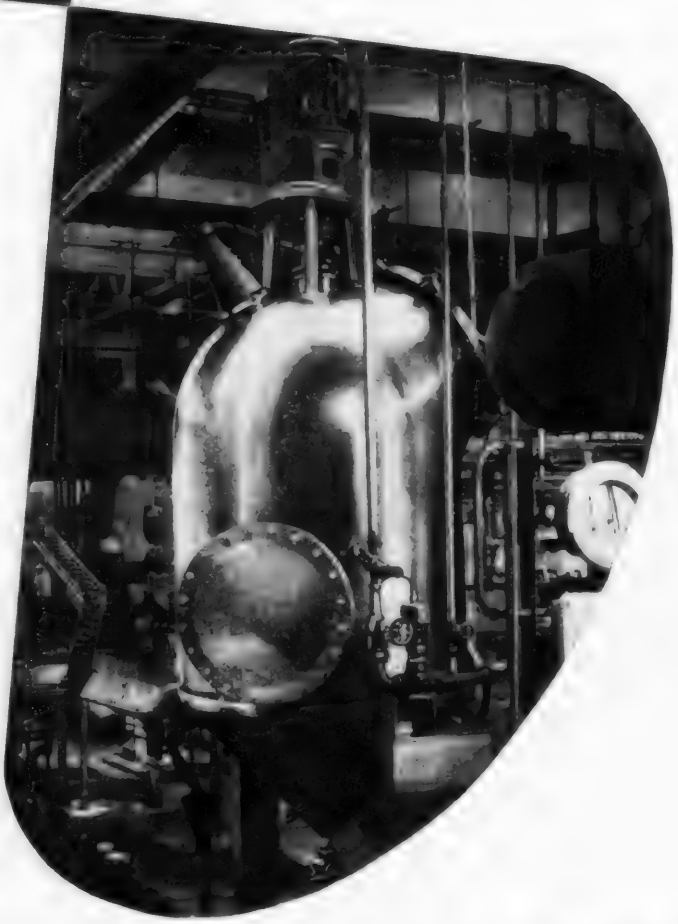

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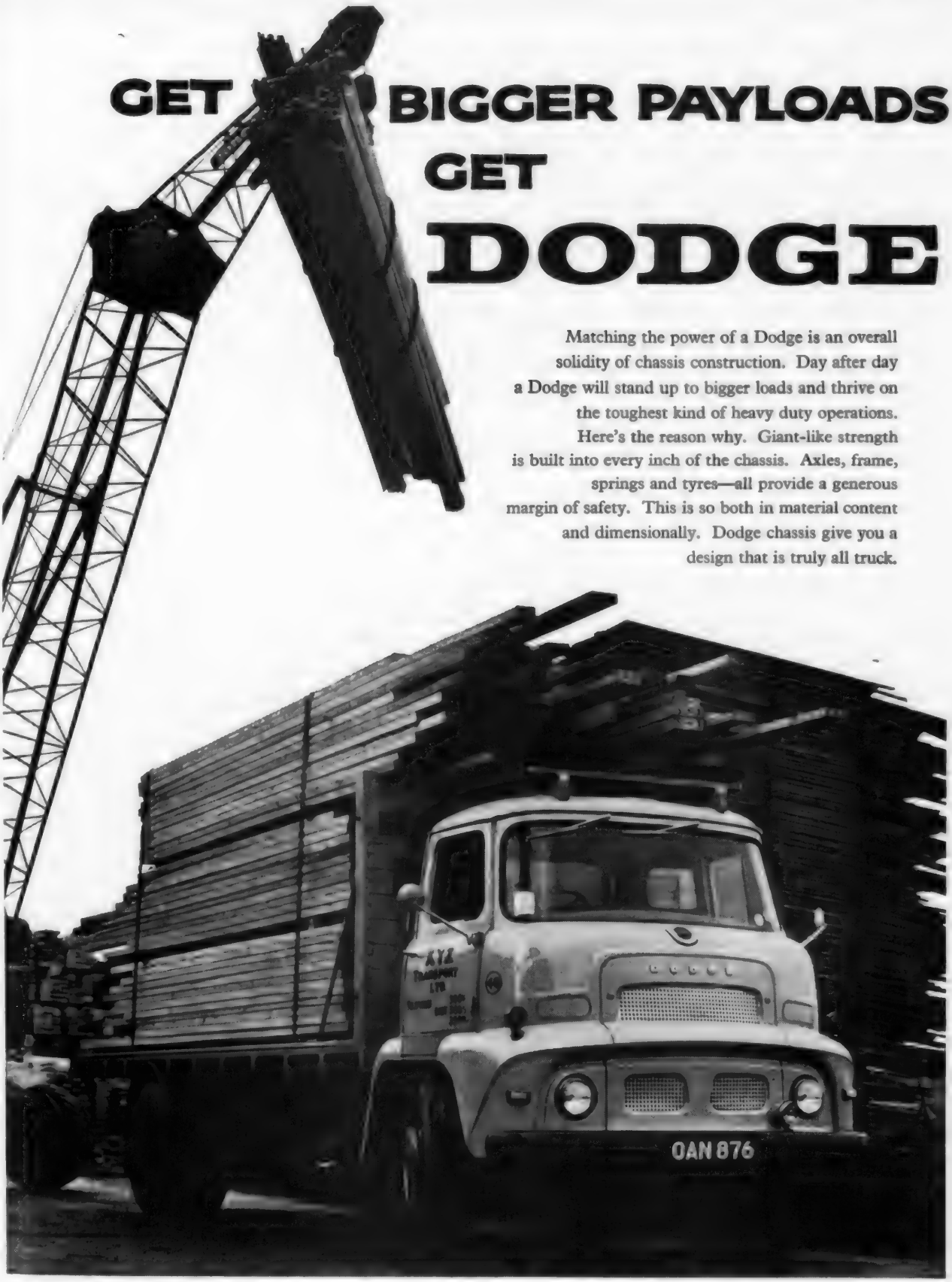

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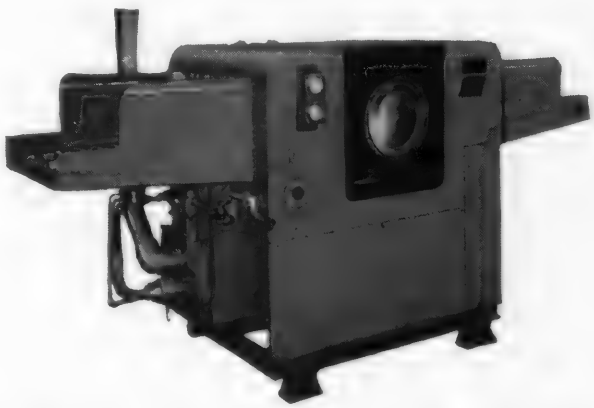

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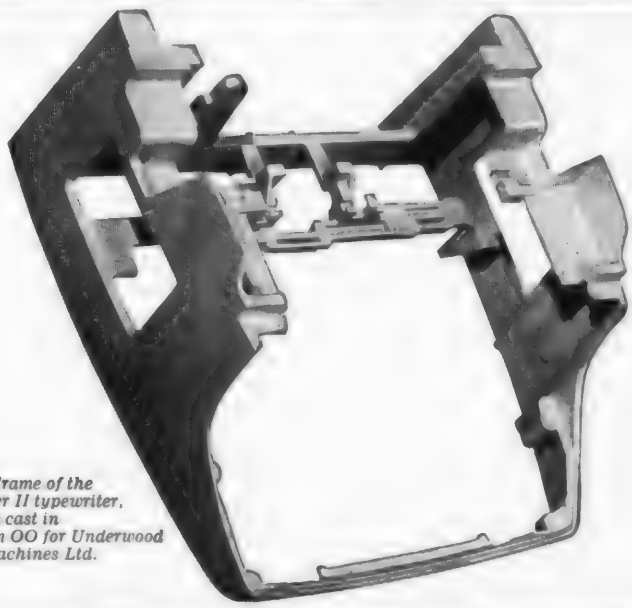

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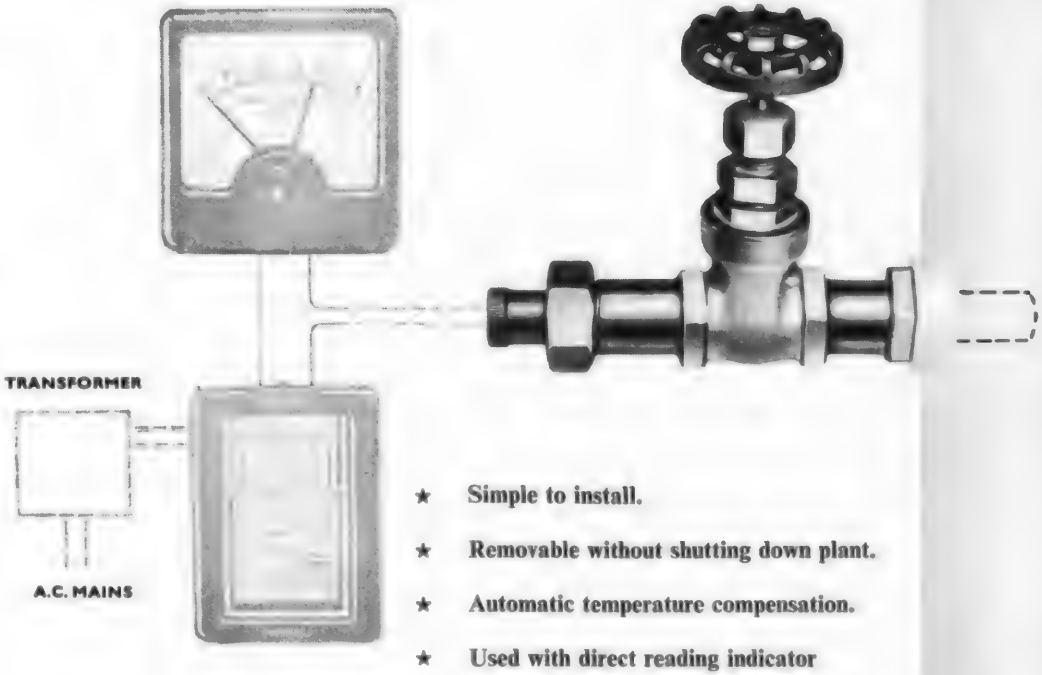

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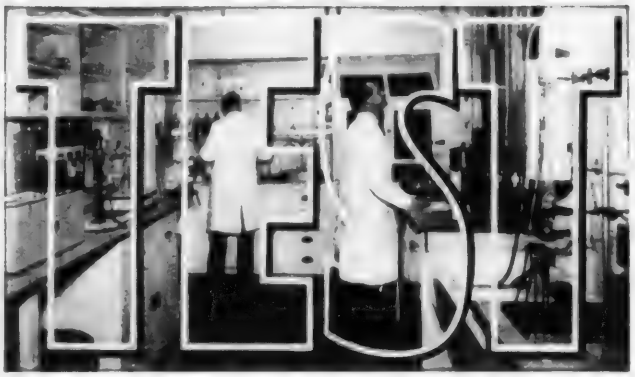

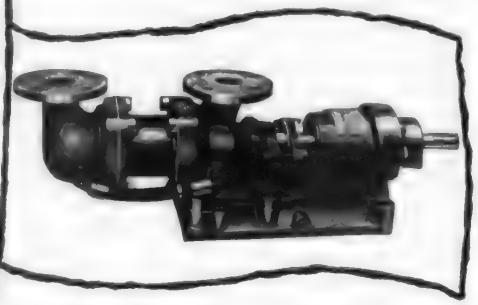

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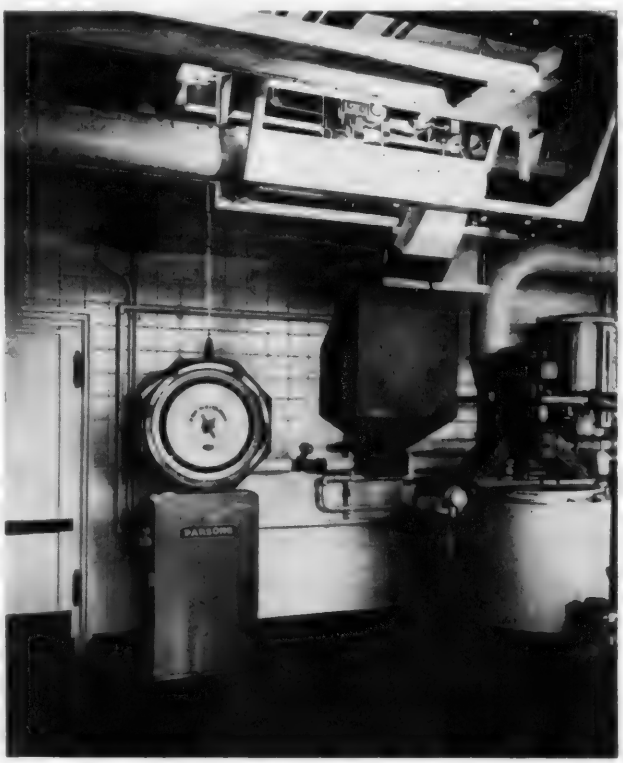

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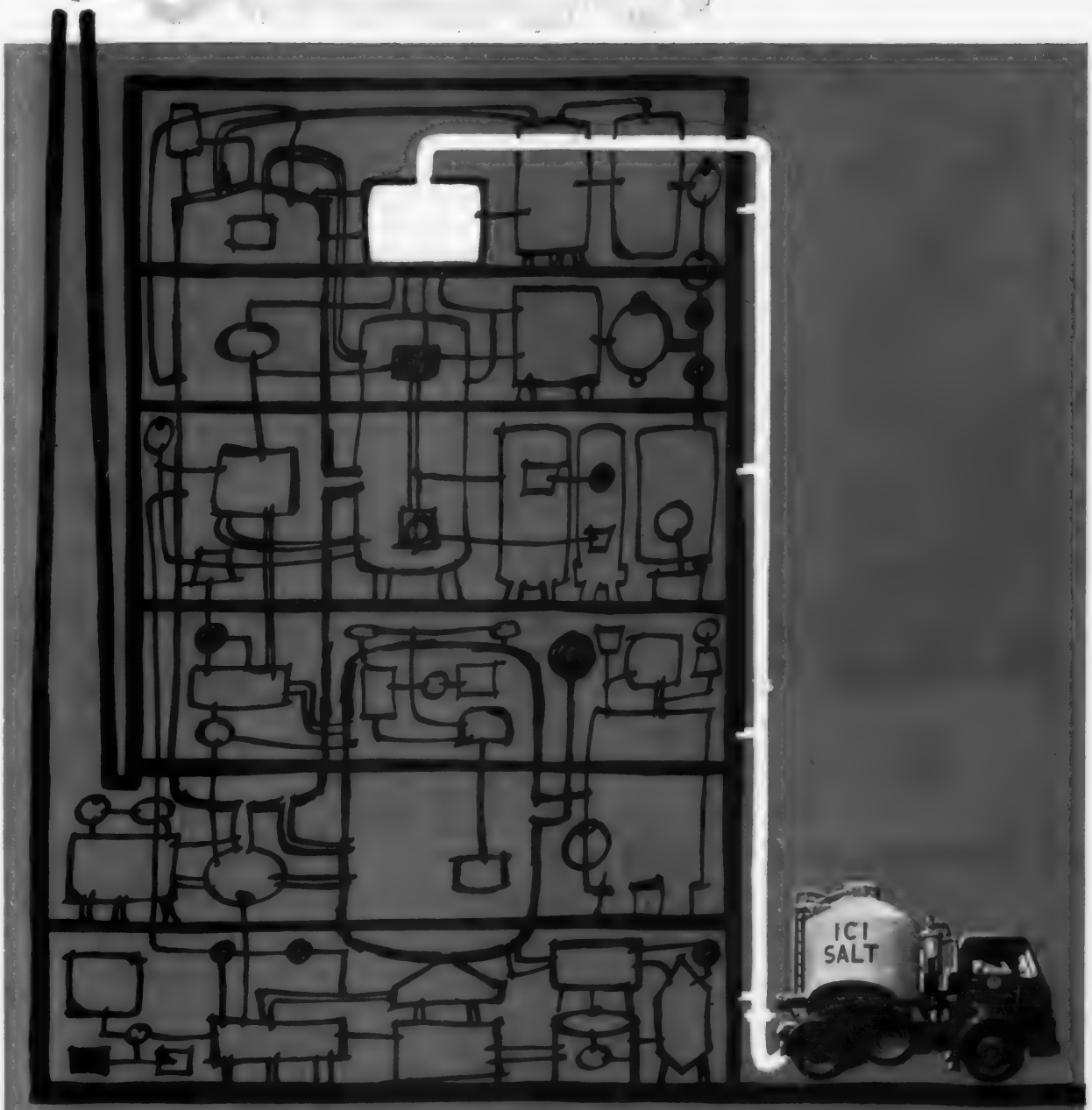

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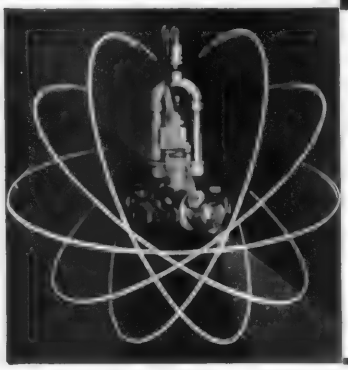

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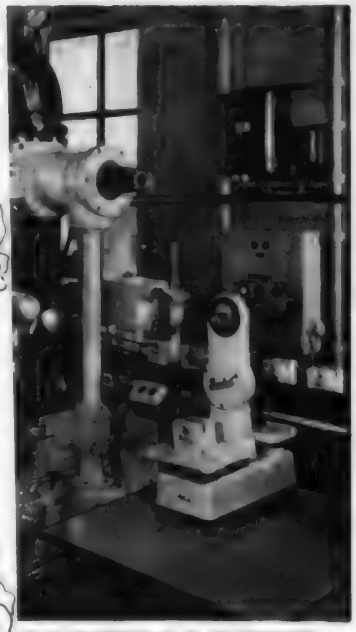

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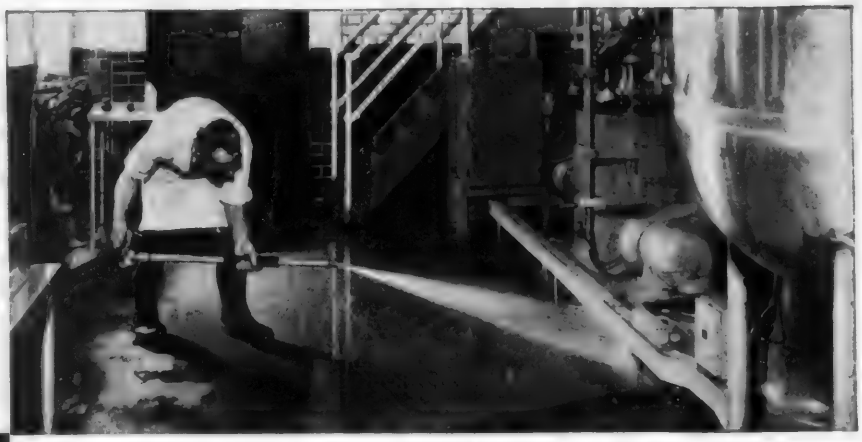

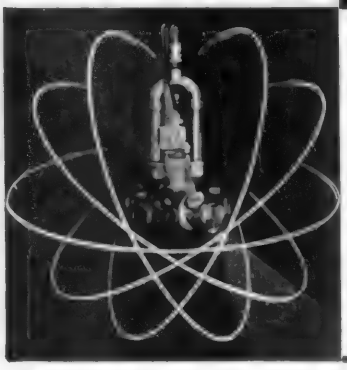

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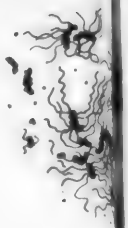

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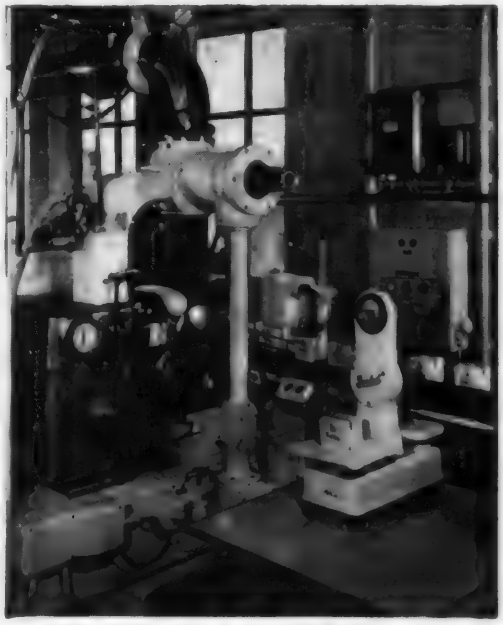

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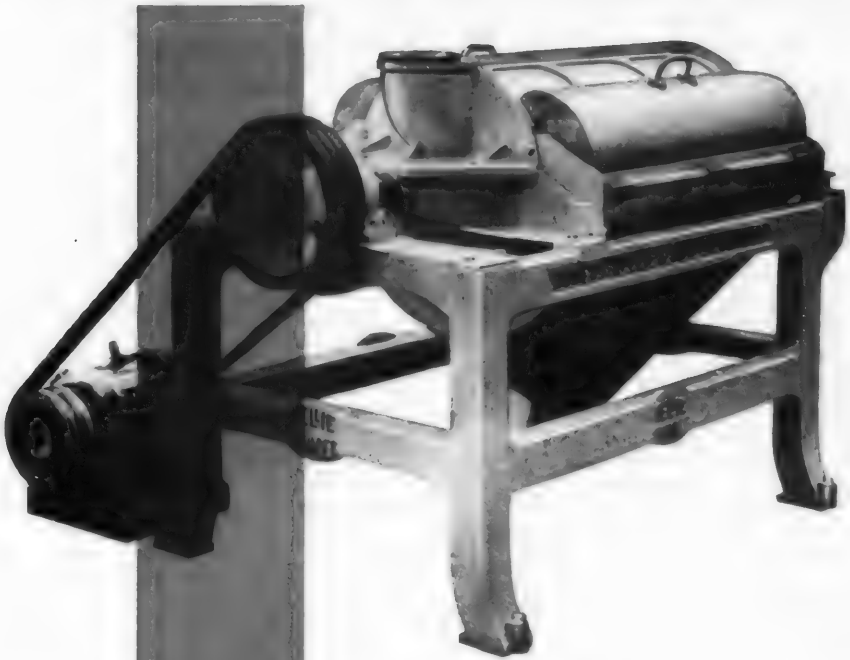

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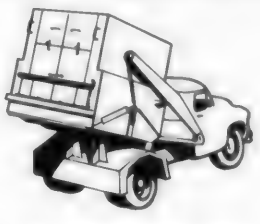

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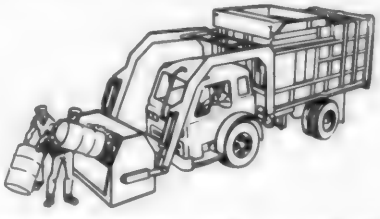

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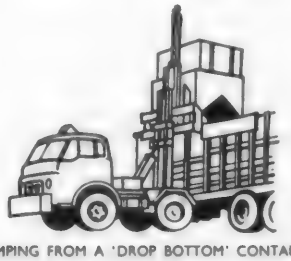

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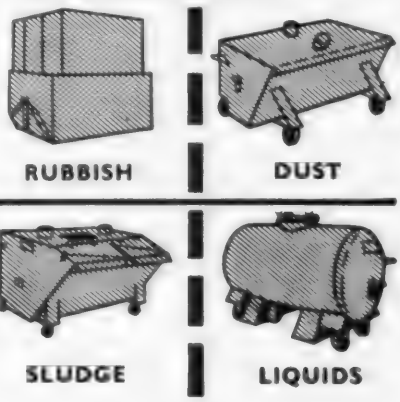

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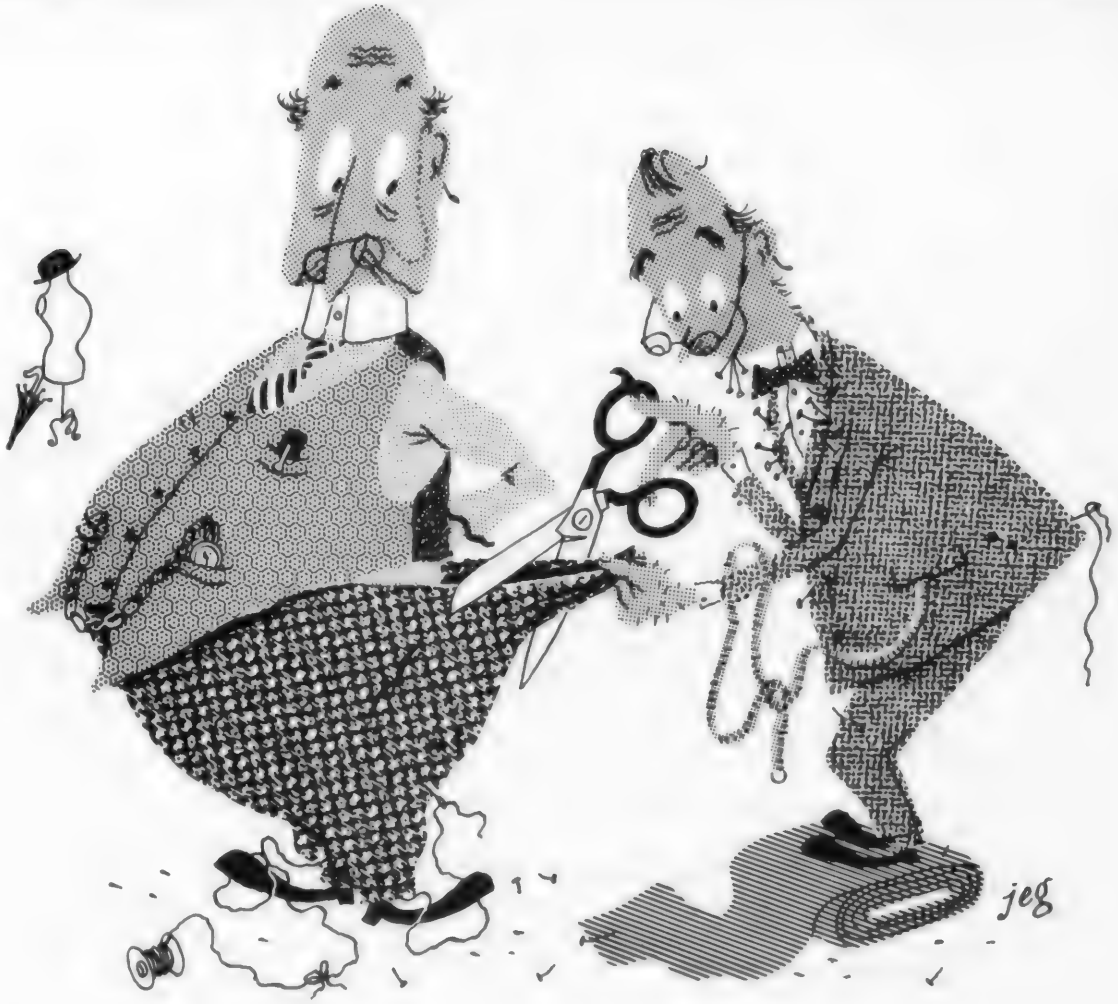

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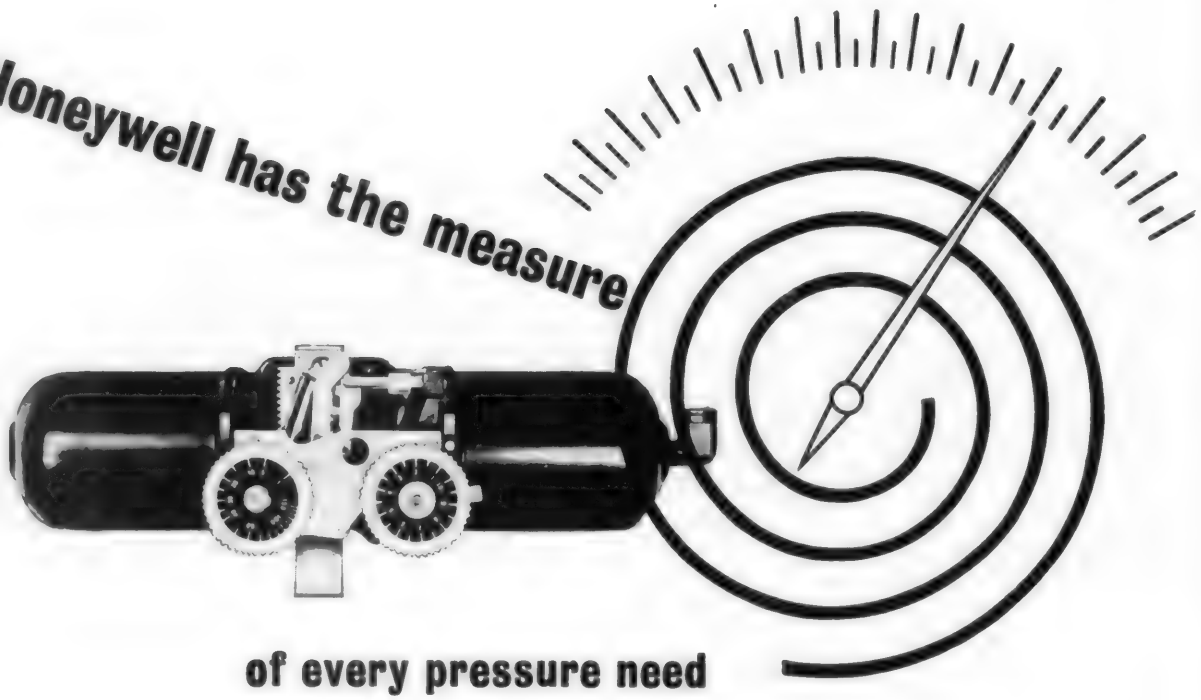

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FOOD MANUFACTURE

Volume XXXV. Number 1 Editor: Anthony Woollen, B.Sc., A.R.C.S., A.R.I.C. January 1, 1960

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The Examination of Edible Oils & Fats (No. 4)

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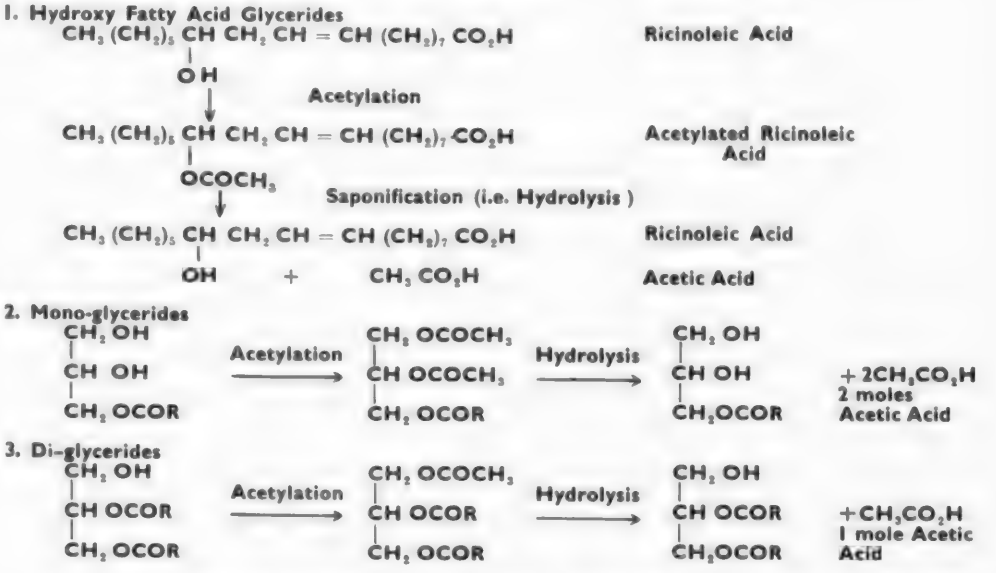
HYDROXYL AND ACETYL VALUES

Definitions *The Hydroxyl Value is defined as the number of milligrams of potassium hydroxide required to neutralise the acetic acid capable of combining by acetylation with one gram of the oil or fat.*

The Acetyl Value is defined as the number of milligrams of potassium hydroxide required to neutralise the acetic acid obtained when one gram of an acetylated oil or fat is saponified.

These two values are really different ways of expressing the same result, viz.: an increase of the free hydroxyl groups present in an oil or fat. Free hydroxyl groups in oils and fats may be met with in two ways. Firstly, an hydroxyl group may be present in a fatty acid combined with glycerol in a triglyceride. A typical example of this is ricinoleic acid, the major fatty acid present in Castor Oil. Ricinoleic acid, otherwise 12-hydroxy-oleic acid, may be acetylated at its hydroxyl group with acetic anhydride in the presence of pyridine. From the amount of acetic anhydride required for acetylation may be calculated the hydroxyl value. Secondly, hydroxyl groups will occur if mono glycerides and/or diglycerides are present in the oil or fat. These may arise from their deliberate addition as emulsifying agents, or by formation in the oil or fat from deterioration when in the crude state. Mono- and di-glycerides themselves may, of course, be examined by hydroxyl value determination.

REACTIONS



The hydroxyl groups above may occur in other positions than shown but this has no effect on the reaction.

An alternative route for the Acetyl Value of triglycerides containing hydroxyl groups is by calculation from the difference between the Saponification Values of the Acetylated product and the unacetylated product.

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LN 60-8058

FOOD MANUFACTURE

Vol. XXXV, No. 1 January 1, 1960

Not-so-pure food abroad

OUR mention last month of Fez, in Morocco, in connection with celebrations to commemorate the start of the canning industry, coupled as it was with the forthcoming centenary of the passing of the Pure Food Act, lends a sombre irony to the report of 10,000 Moroccans poisoned by cooking oil which had been adulterated with mineral oil. It is not clear whether the persons responsible for adding the mineral oil, intended for flushing out aero engines, knew of its harmful properties as a cooking oil extender; even if they did not, the grave fact remains that the victims are paralysed in varying degrees, in a country which boasts only 17,000 hospital beds among a population of 10 million.

We in this country can be thankful that for one hundred years some sort of food legislation has been in force, when news comes in of the pure unadulterated muck fobbed off in some countries as food. How trivial seem some of the clamourings here, for laws about dairy cream, for example, or about couverture made with skimmed milk, when in certain places overseas evil things are done in the name of the food industry.

There is, for example, the cargo of "tinned steak" which arrived recently at Avonmouth; intended, it seems, for the "natives" of the exporting country, "a member or semi-member of the British Commonwealth south of the Equator," this cargo had apparently been sent to this country by mistake. The report of the Bristol medical officer of health makes unappetising reading; the "steak," he said, comprised among other things bone, gristle, hairs, bits of kidney, liver, artery and vein. We are grateful to Dr. R. C. Wofinden, the medical officer, for drawing attention to the muck sold as food to our less fortunate brothers in the Commonwealth.

It is a long time since we heard of foreign bodies in milk, and the British housewife takes the uncontaminated purity of her daily pint on her doorstep as much for granted as the seven days a week delivery service which puts it there. It is right that this should be so and a tribute to the efficiency of the British dairy industry. We realise our good fortune only when we read of the grisly haul from milk bottles sold to the public in Naples, where milk collection and distribution, previously under private enterprise, is now the responsibility of the municipal authority.

Besides a complaint that paint had been mixed with the milk, other finds included a beetle, a frog, and the inevitable dead mouse. When the plant was put under police supervision as a result of these complaints, all was peaceful for a while until a lock of hair was found.

Will chemical tests solve growers' problems?

SELECTION of suitable varieties of vegetables for processing by means of a simple chemical test is now becoming a reality. This was the gist of some interesting asides casually cast off by Mr. W. B. Adam, Director of the Fruit and Vegetable Canning and Quick Freezing Research Association, during the course of his lecture on "Recent Advances in Food Preservation" at the Royal Society of Arts, London, recently, a meeting at which the chairman was, very appropriately, Mr. W. V. Smedley.

The mechanisation of harvesting and processing of crops has presented problems to the plant breeder, who is now required to supply vegetables tailor-made as to size, shape and composition to fit the machines and standardised conditions of processing now largely the rule. The position is well exemplified by the remark made to us by one of the staff of a well-known American canning firm, who said that as their snibbers dealt more efficiently with straight beans than with curved, their suppliers just had to produce straight beans of a certain length. If the beans were not straight, they were not bought, and that was the end of it.

In view of the rigid specifications laid down by the processors, it is not surprising that processors, growers and plant breeders work hand in hand. If chemical tests can eliminate unsuitable new varieties from plant breeders' selections, years of unnecessary and tedious field and processing trials would be saved. Work along these lines has been going on at the Campden Research Station, and it is now known, for example, why all varieties of broad beans except one are unsuitable for canning and that, in general,

white flowered varieties of some vegetables give better results than those with coloured flowers.

The stage has been reached where chemical tests involving colour reactions can be correlated with processing suitability; unfortunately, Mr. Adam did not delve as deeply as we would have liked into this interesting topic, but as the lecture's subject was food preservation this is not surprising.

Nauseating vomits?

A LURID article in the Transport and General Workers' Union's *Record* takes exception to our report (October, p. 398) on British Glues and Chemicals' process for extracting edible protein from vegetable matter. A few extracts show its general tone:

"The lordly scientists" (it begins) "who are now nearly all set to take over eventual control of the world . . . are so arrogantly sure of their overlordship that they don't even try and sell themselves to us . . . Can't they unbend to the extent of attractive packaging, or a whiff of exciting sales-talk, with which to introduce their wonder-muck?

"But the lab big-shots can't be bothered to go out of their way to create a demand for the nauseating vomits they mock up for us. To them our tastes are uneconomic frivolities, our appetites just indices to the need for more nourishment—intake, to be satisfied with a strictly utilitarian refuelling process . . .

"A truly ghastly, architect's sketch of things to come appeared in a recent issue of FOOD MANUFACTURE . . . The article comes out of its corner fighting—hitting hard at the body. It is headlined: 'Edible protein from grass and oilseed.' 'Shock-wave process may solve problem of protein-deficiency.' Who wants shock produced food? Even broilerhouse fowls are at least preserved from shocks . . .

"The firm engaged in this interesting trade is, believe it or not, British Glues and Chemicals . . . I am not in the least bit happy about the prospect of saying grace after a meal of their products.

"There is a long and fiendishly detailed description, in the FOOD MANUFACTURE article, of the process by which inferior garden-bonfire-fuel is converted into tasty snacks."

There is more of such drivel. Why do we bother to quote extensively from this rubbish? Because it aptly illustrates the ignorance and stupidity which has in the past hindered, and which hinders still, those who try to do something to help the human race. Has the writer of this diatribe ever seen a little child suffering from kwashiorkor, the disease caused by protein deficiency? We could show him a photo of one to bring a lump to his throat if he cares to visit this office.

Has he ever heard of the hydrogenation of whale-oil to produce margarine? Perhaps he would care to write similar invective against the pasteurisation of milk; to this and other processes invented by the demoniac "lab big-shots" many of the Transport and General Workers probably owe not only their rousing good health but their lives.

We try to write for intelligent people. The news we report is offered in the belief that it will spread a little enlightenment. If in the process we offend simpletons such as the writer of the article quoted, that is their misfortune, not ours.

South Africa v. Australia

LAST year, South Africa lost at least £2 million in canned fruit business with Britain, according to a recent statement of the South African Fruit and Vegetable Canners' Association in Cape Town. A lot of the business went to Australia, whose advertising expenditure is 5 times that of the Union and who has raised £1 million for this purpose. Half of this comes from the Australian Government, the remainder from the industries concerned.

According to some observers, advertising has played a major but by no means exclusive role in stimulating Australian sales in Britain. Another factor has been Australia's price policy. In the first 7½ months of 1959, South Africa sold in the U.K. slightly more than 2 million cases of canned deciduous fruit and 487,000 cases of canned pineapple. In the same period, Australia sold about 700,000 more cases of canned deciduous fruit and about the same amount of canned pineapple.

The marketing of canned pineapple must be considered separately from other fruit; it is a different product and supplies are available from several countries, notably Malaya, which does not can deciduous fruit. An important point is that Australia has a much bigger domestic market than South Africa, which absorbs nearly half its total production compared with South Africa's mere 10%. Last year, Australia's exportable surplus was much bigger than in previous years; against this, the British market was well stocked with canned fruit. The Australian Canned Fruit Board therefore decontrolled the sale of canned pineapple and canners cut prices and gave large promotional allowances. This won the Australians a big share of the British market for canned pineapple.

As for canned deciduous fruit, the Canned Fruit Board retained control of its sale. Whereas canned peaches formed the biggest part of South Africa's offerings, Australia's main offering was canned pears, which fetched the best prices of all canned deciduous fruit on the British market.

In 1958, South Africa sold £12 million worth of canned fruit to Britain, compared with Australia's £10 million, but in 1959, for the first time, Australia gained the lead in sales, helped by a gigantic advertising campaign costing £400,000 and covering television, newspapers and hoardings all over the country. When Australia cut prices, the result was a flood of orders, and it is said that some British importers are in consequence evading price agreements with South African firms.

Both countries fear American competition; American overheads are lower, and the U.S.A. has 30,000 tons of the finest quality peaches to sell, bought from farmers at £10 a ton cheaper than South African canners pay their farmers. Last year the American slice of the £41 million British market jumped to £3,200,000, and with dollar restrictions now removed, this year's share looks like being even more.

Canned fruit in the Far East

In the Federation of Malaya and Singapore, mainly as a result of the marked increase in the local production of popular varieties of fruits such as pineapples, lychees and guavas there has been a decline in the total imports of canned fruits of all kinds. The bulk of the canned fruits imported from South Africa consisted of canned grapes, for which there is an extensive demand among the Chinese and Malay populations at the time of their New Year celebrations.

The demand for other varieties of canned fruits is largely limited to the European community and to those Asians who have adopted European standards of living. There was also a decline in imports of fruit juices from all sources. This was mainly due to an increased local production of pineapple and orange juice by a number of large processors in Singapore whose products are widely distributed among the large number of small Chinese shops and street vendors. The principal overseas suppliers of fruit juices have been Guatemala and Panama, the United Kingdom, Australia, China and Hong Kong. South Africa has been seeking a footing in this market, so far not with any marked degree of success.

Working for Unilever

For many years science graduates have been able to pick and choose jobs with a facility that must be the envy of men who graduated in the lean twenties and thirties. Even big companies are forced to engage in active recruiting. Some have small teams regularly combing the universities for the best of the successive crops of graduates. Many have issued publications explaining the career possibilities they offer. The latest we have seen is a handsome booklet from Unilever. Its main purpose is to broaden the public image of the company which, of course, identifies Unilever chiefly with soap and margarine. "We work—metaphorically—behind such slogans as 'Omo adds whiteness to brightness' and 'Fancy calling Stork margarine,' and the purist may wonder how—even with first-rate facilities—any worthwhile satisfying research could be associated with advertising slogans." Thus, says the booklet, and from this point proceeds to enlighten the slogan-bemused reader.

In England Unilever have three main research centres—Port Sunlight (detergents, edible oil products and oil milling), Colworth House near Bedford (food and animal feedingstuffs), and Isleworth, London (dentifrices, shampoos and cosmetics). The work of each of these centres is explained. In addition, there are brief descriptions of a dozen current research activities—water conservation with evaporation resistant oleyl alcohol, detergency, polymorphism of fats, dental caries, fluorescent whitening agents, molecular architecture (synthesis of germicides), preservation of toilet preparations containing non-ionic emulsifiers, development of a shampoo, isolation and identification of food flavours, denaturation of proteins in emulsions, tenderness of cooked vegetables and early weaning pig food.

"Unilever Research," as the booklet is called, certainly gives an encouraging picture to the keen graduate anxious to make his contribution to science and technology. It also deals with the human side of working for Unilever, such as facilities for recreation and amusement in and near the three research centres. Unfortunately one fundamental human curiosity—namely, pay—is not satisfied. Perhaps in the next edition something will be added about the salaries that scientists can expect to earn.

A myth exploded

It is gratifying to one who for years has churlishly refused to accept the claims of advertisers' announcements concerning their products to find that an attitude which could, uncharitably, be attributed to spleen, is borne out by recent researches. Advertisements for shampoos which state that the unction of the scalp with egg will "feed the hair," or that a beer rinse will give it delightful highlights have always excited a certain derision in us; admittedly eggs have their uses and a beer rinse *is* delightful, but only when taken internally.

Recently the Consumers' Association, Ltd., set out to discover what a shampoo could do to contribute towards hair looking its best, and to do this they arranged practical tests with 21 different shampoos, each of which was used 100 times. All the shampoos analysed were good at washing hair, and all, except

one, which was essentially a soap powder, were soapless detergents and therefore as effective in hard as in soft water. None of those claiming extra qualities because of added egg, beer, champagne or lanolin were found, in the practical tests, to have any better effect than those that did not.

This may come as a bitter disillusionment to those of the fair sex who see in a new shampoo a sort of genteel aphrodisiac, whose use guarantees a husband. From the report above, however, it would seem that the best thing they can do with beer and champagne is not wash their hair in it, but give it to their menfolk to drink; the menfolk can then be rushed to the altar whilst still comatose.

Milk standards for couverture

NORFOLK County protection committee is seeking legislation requiring all milk used in the covering of toffees to be full cream and not separated milk. In a report to the council the committee says that some time ago a sampling officer took a sample of milk chocolate toffees, the chocolate coating of which was found, on analysis, to have been made with separated milk.

The public analyst stated that, in his view, milk chocolate should be made from full cream milk.

"There is no standard prescribed for milk chocolate, however," the committee says, "and no code of practice is accepted by the trade who, through their association, maintain that milk chocolate can properly be made from separated milk if the manufacturer finds that it suits the taste and pockets of his customers."

In view of this, the committee does not advise legal proceedings.

But it considers the position is "very unsatisfactory," and is "firmly of the opinion" that the word "milk," in whatever context dealing with food it is used, should be capable of one meaning only. At least this makes a change from the controversies over "cream" doughnuts and so on which have excited so much attention in the past. Surely the next step must be to suggest that chocolate and sugar confectionery must be labelled and the ingredients listed. Or do we credit the public with enough sense to buy either what they like or what they can afford!

Removing strontium 90 from milk

ONE possible method of removing strontium 90 from the milk we drink was discussed at a recent meeting of the American Dairy Science Association held in St. Louis, Missouri, where it was reported that, by making use of an ion exchange method, up to 94% of the radioactive strontium 90 could be removed. Research work is continuing to determine conclusively whether the process affects the dietetic value of the milk, but so far the indications are that it does not.

The radioactive milk was treated by passing it through a cylinder containing a calcium based resin and, according to B. J. Demott, associate professor of dairying at the University of Tennessee College of Agriculture, the treated milk then contained more calcium than it did before processing, picking up the additional calcium from the resin. The second part of the process is described as the calcium retention factor. In 1954, a number of researchers, headed by Willard F. Libby of the Atomic Energy Commission, applied the ion exchange process to milk purification, using a resin made by the Dow Chemical Co. This resin removes most of the calcium from the milk, thereby restoring the calcium content to a more normal level, and most of the strontium 90 at the same time.

The process is not ready yet for commercial use, but Professor Demott is confident that should the need arise then the basic process could be used by commercial dairies. There are several technological problems to be solved, but the main snag with any project of this nature does not occur: Prof. Demott says that the new calcium-based resin method does not cause any appreciable change in the flavour of the milk.

Exit the whale?

THE failure of the International Whaling Commission to secure agreement on the catches of the countries participating may lead to a free-for-all in the Antarctic with the extinction of the rarer and more valuable species as the outcome. Such a result would be a tragedy for Natural History and a blatant and squalid flouting of the principles of nature conservation and husbandry.

The sailors of the whaling fleets are not to blame. They have their job to do, in conditions more uncomfortable and arduous than most are subjected to in this soft age. One feels that the disagreement is this time hardly the fault of the Russians, whose quota was agreed early on in the discussions, or of the Norwegians, who although they eventually walked out of the recent London Conference which ended so abjectly, and who are not now bound by any agreement, have voluntarily restricted themselves to a self-imposed quota.

Precisely because this issue is of comparatively small economic importance has the matter been left to petty commercial interests to wrangle about among themselves. Yet ecologically the matter is of supreme importance; how absurd it is that the world looks on while the largest living animal is being slowly plundered out of existence, and cannot, it seems, do anything about it.

Manufacture of " Munchmallows." (*Left*): Marshmallow being deposited; the " tails " are rolled flat before enrobing. (*Right*): " Munchmallows " entering the enrober under the watchful eye of a supervisor.

Near the Ultimate in Automation–II

Macdonalds' handling and processing methods boost biscuit production

Continuing the story, begun last month, of the Macdonald factories, this article shows how mechanisation of bulk handling combined with a unique sales policy has brought about a sevenfold expansion of this Glasgow enterprise, to which FOOD MANUFACTURE recently paid an exclusive visit.

THE sugar is discharged from the silo through control gates disposed along the length of the silo and from there into a reclaim screw conveyor with a feed rate of approximately 5 tons per hr. The slide gates are opened one at a time in sequence to ensure regular turn-over of sugar.

The reclaim screw feeds into an inclined feed worm screw at a rate of 5 tons per hr., and from there into a double leg receiving hopper with a level control probe. From the receiving hopper the sugar is transported through two rotary valves with their respective conveying lines. Two take-off conveying lines are used to ensure that none of the consumption points over the sugar grinding mills is starved at any time.

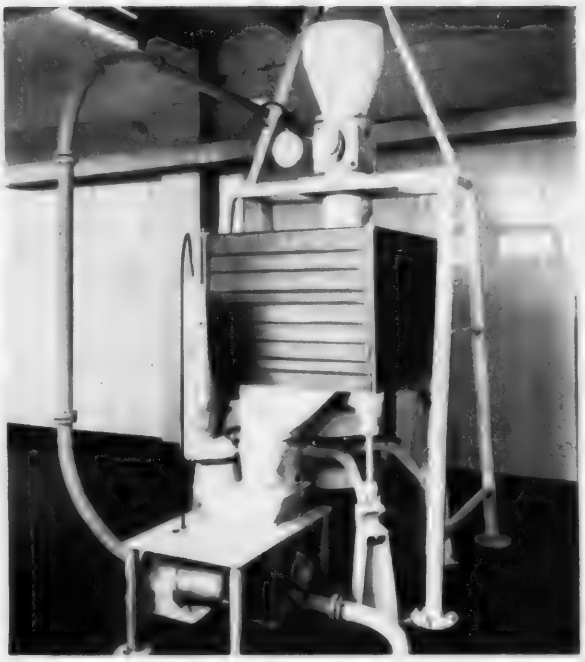
The first line feeds automatically a 1 ton capacity granulated sugar bin over a sugar mill, and from there to a 7 cwt. capacity milled sugar bin with triple screw dischargers. The screw dischargers feed into a set of Rownson screw conveyors for milled sugar, forming a ring main from the milled sugar bin around the system and back again to the milled sugar bin. The ring main has four gravity chutes with automatic solenoid valves discharging into the four 900 lb. capacity weighing hoppers above the high-speed mixers. Sugar is kept continually on the move in the ring main to prevent caking.

The sugar mill is a hammer mill rated at 1 ton/hr. capacity, although Macdonalds work it at 30 cwt./hr. The large quantity of air put through for cooling takes 5-10% of entrained sugar, which is recovered.

The second sugar conveyor system pneumatically feeds either to a 1-ton, double-legged granulated sugar bin over two mills serving the creaming plant, or a 1-ton capacity bin serving the marshmallow plant. In all cases these bins are automatically topped up by means of the level controllers.

The sugar mills are put as close as possible to the places of use.

The 1-ton granulated sugar container for the marshmallow plant has a three-legged support, each leg fitted on a straining gauge or load cell. From the rotary feeder outlet, the sugar gravity discharges to a screw conveyor underneath. The amount required has been previously set on a load cell indicator dial which only requires to be re-set when a recipe is changed.



(*Left*): **Some of the feed pans for fats and liquid glucose which feed the mixers on the floor below.** (*Right*): **The flour sifter, through which flour from the cyclone blender on the floor above is passed before being pumped pneumatically to the weighing hoppers.**

Fats

The 4 blended fat storage tanks, which are pressurised, hold 3 tons each, and are controlled thermostatically by electrically heated oil jackets.

Before use, fats have to be blended, and for this purpose they are pumped by automatic metering pumps, in amounts pre-set on a control panel, from the 10 thermostatically heated tanks in the tank building to one of four blending vessels.

The fats are pumped in order of increasing stability. The pipeline is 500 ft. long, and an excess of the most stable fat, exactly enough to fill the pipeline, is pumped last, the excess then being withdrawn back to storage.

The blended fat is transferred to a holding vessel, recirculated through a plasticising and homogenising machine until the consistency is correct, cooled to 64°F. (at which temperature it is stiff when at rest but has the properties of a liquid when being pumped), and then pumped to the 4 pressurised storage silos which hold 3 tons each. Here the plasticised blended fat is stored ready for use under a pressure of 2 atm.

Level indicators on the storage silos are coupled to automatic safety devices which prevent fat being drawn from any silo which contains insufficient for the completion of a batch.

It might be mentioned at this point that glucose syrup and invert sugar solutions are stored in exactly the same way except that they are not pressurised.

Chocolate

Liquid chocolate, delivered by road tanker, is stored in the original factory in three 10-ton storage tanks, and from these it is metered to eight blending kettles of a capacity of 2,000 lb. each. The amount of chocolate pumped over is measured by flowmeters calibrated directly in lb. of chocolate. Blending temperature is 100°F.

Other ingredients

Process water is chilled to 39°F. in a stainless steel tank in the roof filled with a cooling coil. (The refrigeration plant for supplying plant cooling water is also located here, although the chilled waters for the two purposes are kept separate.)

Sundry ingredients not otherwise covered such as wholemeal flour and castor sugar are weighed out by hand and fed to the mixers through chutes from the floor above.

Mixing

Part of the conveyor pipes taking flour and sugar to the mixing room consists of flexible canvas tubes. This arrangement is deliberate, so that in the remote possibility of having to reject flour, the fact of having to change the pipe connections manually impresses on the operators' minds where the material is going, and eliminates the likelihood of tons of flour or sugar being pumped to the wrong place through forgetfulness.

In the mixing room are three Baker Perkins horizontal high-speed 2-sack mixers.

Both the delivery of ingredients to the mixers and the actual mixing operation itself are controlled automatically; materials are fed to the mixers in correct order and amount, and the mixers stop and start automatically to suit individual recipe requirements, with the minimum of attention. The whole operation of the mixing room can be controlled by one man.

(*Left*): **Sorting of " Yo Yo " prior to packing.** (*Right*): **The creamed wafers for " Penguin " entering the enrober.**

" Glengarry " biscuits, having been cut from the dough sheet, are shown being separated from it automatically, the biscuits travelling on to the baking oven while the residual dough is returned for re-use.

On the floor above the mixing room is the air-conditioned room housing four automatic weighers. These feed the mixers through pneumatic slides, and are used for both blended flour and sugar. The flour is drawn from service bins kept continuously topped up, as previously explained, and milled sugar is drawn from the ring main in which the sugar is kept continually recirculating.

Glucose syrup, invert sugar and fats are fed to the mixers by pipelines from the storage tanks. A call system operates to make the manual addition of sundry ingredients as foolproof as possible. On each weigher is a call box for each ingredient. The automatic process sequence controller actuates a flashing light on the appropriate call box when the time has come for the ingredient to be added. When he has added it, the operator presses a button on the call box, and the next sequence cannot follow on until this button has been pressed.

The capacity of each mixer is 1,000 lb. Into the mixers in the correct sequence are deposited the weighed solid materials, the measured liquids (fats, syrup, etc.) and chilled water.

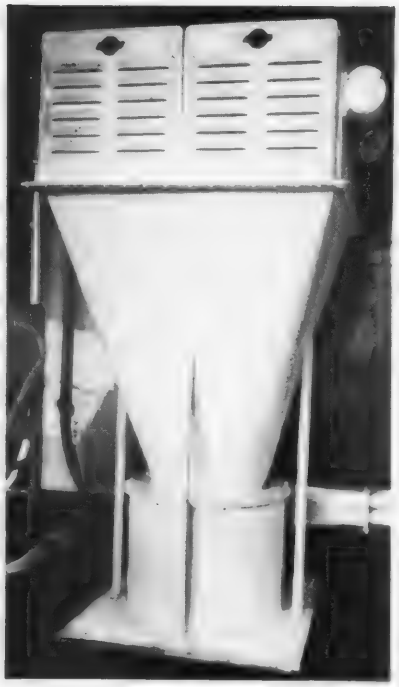
The mixer is operated by a control panel, one for each mixer, and the sequence of operations is controlled by a recipe box plugged in to the panel. The recipe box is a sealed unit, prepared by the electrical department, which actuates the controlling mechanism by electrical impulses, and by merely changing the recipe box, the production line can be switched from, say, "Penguin" to "Glengarry."

The weights of materials deposited in the mixer are controlled by a pre-set dial controller. Thus the sequence of operations is controlled by the recipe box and the amounts of materials by the dial controller.

It is possible to see at a glance whatever stage has been reached in the mixing operation by a series of lights on the control panel, which flash while an operation is in progress and change to steady when complete.

The switches on each control panel are locked and cannot be altered without reference to the supervisor. The operator cannot therefore make any undetected alteration to the process, nor can he himself restart an operation which has stopped through a fault developing.

Mixing times, of course, vary according to the product, but are of the order of half an hour from start to finish. When mixing is finished, the mixers are opened and discharge their contents to the



The cyclone blender for flour.

hoppers feeding the production lines in the bakery on the floor beneath (ground floor).

Control room

A separate room on the mixing floor houses a master control panel on which is a mimic flow diagram of the entire bulk handling operation, and on which can be seen the contents of storage tanks, what machines are in use, the flow of materials through pipelines and in conveyors, and other information.

All functions of main, subsidiary and sequence control panels are cross-linked to prevent any possibility of error. A fault developing on any piece of equipment indicates the source on a fault-finding section of the main panel, and stops all related operations until corrected. The equipment will not respond to any attempt to send an out-of-sequence signal through the emergency hand operation controls. Any sequence can either be stopped and re-started, or returned to zero.

The bakery

On the ground floor are three biscuit production lines, comprising dough cutting and embossing machines, ovens, enrobers, and coolers, with ancillary wrapping and cartoning machines. These lines continuously produce "Penguin," "Yo Yo" and "Glengarry." There is also a marshmallow section producing "Munchmallows," with mixer, depositors, enrobers, coolers, and wrapping and cartoning machines.

There are two ways of forming biscuit shapes, by rotary moulding and by embossing. Both methods are in use; one production line uses rotary moulding only and the other two both methods.

The biscuit shapes are cut from continuous sheets of dough which have been sized by gauge rollers. The surplus dough from the sheet from which the shapes have been cut, is returned to the feed mechanism for reworking.

Testing biscuits on one of the production lines in the bakery.

Two of the lines have the conventional type of oven comprising many individual burner heads in the baking chamber. In one oven these are automatically controlled in six groups, and the baking time and temperature once set is maintained automatically. The other conventional type oven is similar in operation but is manually controlled throughout.

The third oven is of the cyclotherm type and has five burner units. In these the combustion products are circulated through tubes above and below the conveyor bands. The biscuits are thus heated by radiant heat.

All ovens, the longest of which is 250 ft. long, are gas-fired. The cyclotherm oven was originally oil-fired, but Macdonalds wished to standardise on gas and the oven was converted.

The two types of oven are complementary, some products baking better in one and some in the other. The cyclotherm type is unsuitable for products which require moisture to be absorbed.

The biscuit shells are transported to the first floor by overhead rail conveyor where cream fillings for "Penguin" and "Yo Yo" are fed from hoppers and deposited on the cooled biscuit. In the case of "Penguin," the cream is deposited on the lower biscuit layer, and the upper is then gravity fed on top.

Munchmallows

These chocolate-coated marshmallows are made in a separate section of the bakery. The marshmallow, an aerated mixture of sugar, invert sugar, gelatine, glucose, water and flavouring, is mixed in an Oakes mixer and then passes to two lines, each of which consists of a depositor for depositing on to the chocolate biscuit base, a *Miracloth*-covered non-

In the quality control laboratory.

" Bandit " biscuits being fed to the wrapping machines.

stick roller for flattening the tops, a warm-air skinning tunnel, a chocolate enrober, and a multi-tier cooler from which the product emerges at a temperature of 60°F.

Packing and cartoning

In this department a high degree of automation is achieved with foil-wrapping machines of the latest type, which it is beyond the scope of this article to describe in detail.

Quality control

Maintenance of quality is a vital task carried out by the laboratory, who examine raw materials, control production and carry out research work. New lines are developed in an up-to-date test bakery.

Each batch mix is tested before it is allowed to pass to the production lines, and a few rows of biscuits from the mix are test baked to make sure everything is right before the bulk is processed.

New factory

Opened last year, the new plant at North Cardonald, also on the Hillington Estate, a short distance from the main factory, is now in full production on "Bandit," "Yo Yo" and "Chocolate Digestive."

A complete description would need a separate article, and this review can cover only very briefly the main points of interest.

Liquid chocolate for all products is stored in six 13-ton tanks in a hot room at 115°F. and automatically blended and delivered to the tempering machines, as required, through stainless steel jacketed pipes. Continuously tempered chocolate is delivered to the various depositors and coaters through ring mains.

Tanker trailers deliver bulk caramel syrup from the main factory to be blended with condensed milk (from 3 ton storage tanks) and other ingredients on a push button metering basis, to make the caramel for toffee "Yo Yo" in four boiling pans. The hot toffee is blown to a cooling vessel where colour and flavour are added, before being pumped to the depositing machine. Pre-mixed cream from the main factory has flavour added and is fed simultaneously from six mixers to sandwich type machines for the other flavours of "Yo Yo."

Biscuit bases for "Yo Yo" and "Chocolate Digestive" are transferred on "floats" from the main factory. These products are cooled (after coating) in conventional multi-tier and straight-through coolers of considerable length. The "Yo Yo's" are individually wrapped on Sapal BN/k machines at up to 135 pieces per min., the "Chocolate Digestive" being put out in a *Kliklok* tray overwrapped on a Forgrove LFA cellophane machine.

Wafer sheets (18 in. by 11 in.) for "Bandit" are baked in 24-plate wafer ovens. The cream filling is deposited in wafer spreaders and the sandwich then goes through a press which standardises its thickness. It then passes to a cooler and a wafer saw which cuts it into portions. These are afterwards packed in trays and stored for conditioning before use.

The operation of the Jensen moulding plant producing the final "Bandit" piece has been made as automatic as possible, and the whole plant encased in a sound-proofed insulated room to prevent the considerable noise of the chocolate vibrators from disturbing the rest of the factory. A measured quantity of chocolate is deposited in the pre-heated "moulds" attached to continuously moving main chains. Wafer pieces are fed automatically from magazines into the chocolate and pressed down accurately into place by a pressing device which leaves just the correct amount of chocolate all round. More chocolate is poured over the wafer and levelled off before the frames pass to the cooler. The cooled pieces are vibrated out on to a stainless steel packing conveyor, then fed to

(Concluded on page 29)

FOOD MANUFACTURE
ANNUAL REVIEW

CONFECTIONERY

By D. R. Felstead,* F.R.I.C.

Consumption ★ exports and imports ★ sugar prices ★ cocoa and fat prices ★ paperboard odour ★ dental caries ★ lead and arsenic limits ★ gelatine ★ education ★ research international meetings

DURING 1957 and 1958 the average consumption of sugar and chocolate confectionery was constant at 8·3 oz. per head per week, which was a drop of a quarter of an ounce on the figures for the two preceding years. Unfortunately this reduced consumption has continued in 1959, and the average quantity of confectionery entering distribution for the first nine months of this year is down by half an ounce per head per week on the corresponding nine months of last year. The reduced consumption applies to both sugar and chocolate confectionery; the ratio of the sale of sugar confectionery to chocolate confectionery has remained fairly constant for the last three years. These are not encouraging statistics, particularly when considered with the increasing total consumer expenditure which rose, for example, by about 5% between 1957 and 1958, and the picture is not enhanced when the export figures for the first nine months of the year are examined. The value of the industry's total exports was approximately 2% lower than for the corresponding period last year, although a welcome increase of 7% was recorded for exports to the dollar markets.

When these facts are considered, taking into account the fact that the *per capita* consumption of confectionery in this country is the largest in the world, the greatest opportunities for expansion would appear to present themselves in the export field. In general, therefore, the confectionery industry was disappointed when the negotiations for a European Free Trade area reached a stalemate at the end of last year.

Exports and imports

Since that time the British Government had been considering the possibility of free trade between the "Outer Seven" countries, Norway, Sweden, Denmark, Switzerland, Austria, Portugal and the United Kingdom. Such a free trade area would appear to give considerable advantages to the British confectionery industry, for which there are either substantial tariffs or severe quota restrictions on its products in most of the other countries involved. The importation of confectionery into the United Kingdom is subject to low tariffs and no quota restrictions. In this connection it is of interest to note that the imports of chocolate and sugar confectionery from overseas competitors fell in 1958 after the removal of quota restrictions on imports from the Continent.

The following table gives details of trade in this industry between Great Britain and the other countries comprising the "outer seven" in 1958:

	Tons exported from the U.K.	*Tons imported to the U.K.*
Sweden	1871	55
Denmark	459	350
Norway	91	3
Switzerland	166	175
Austria	77	65
Portugal	41	Nil

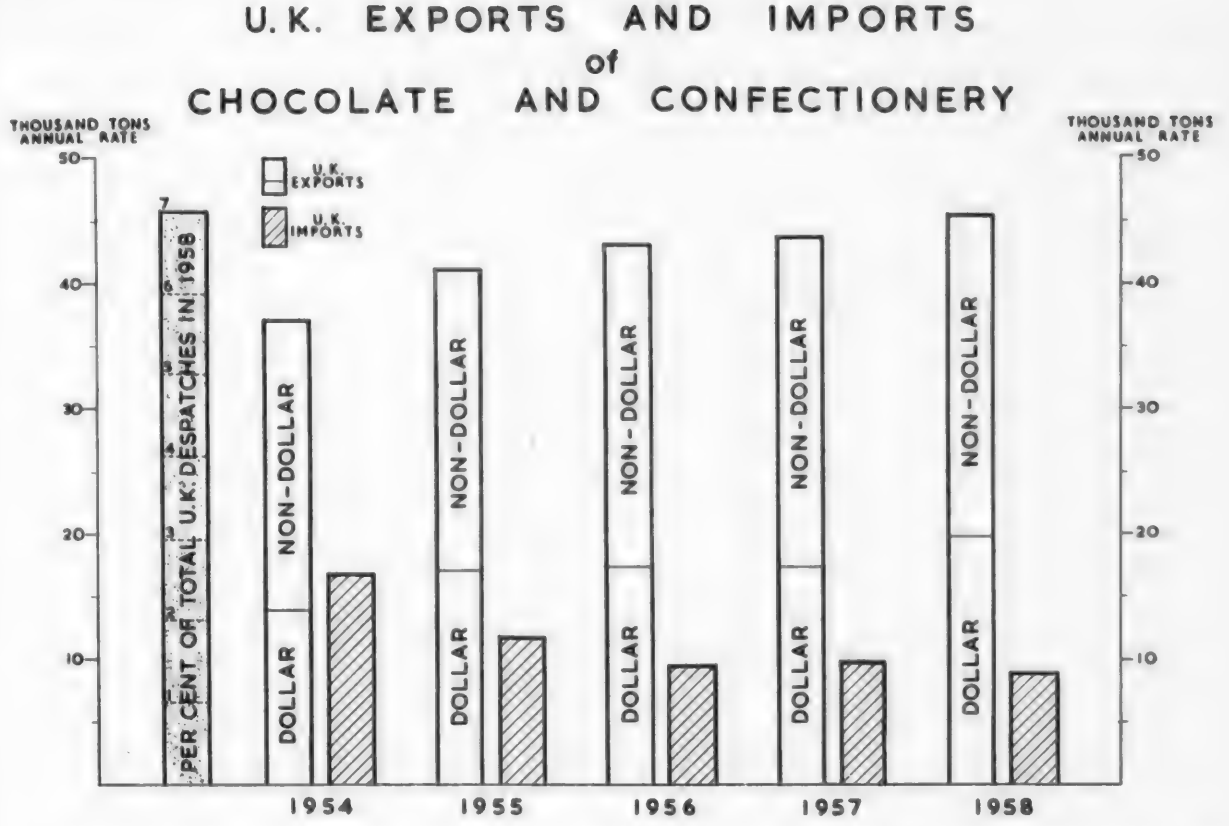
Also of interest is the predominant position of the United Kingdom in the export of confectionery to the United States and this is well illustrated by fig. 1. In spite of this strong position it also illustrates that the United Kingdom is obtaining a diminishing share of these exports, and shows that the United States only imports about 1½% of her total requirements of cocoa and chocolate confectionery.

The two graphs, for which the author is indebted to the Cocoa, Chocolate and Confectionery Alliance for permission to reproduce, illustrate the confectionery imports of the United States and the imports and exports of the United Kingdom.

Sugar prices

The last annual review outlined the transition from unstable sugar prices during 1957 to the more stable conditions which ruled from March last year. Happily this general relative stability has continued during the first ten months of this year and the price for granulated sugar to the manufacturer has remained in the approximate range of 63s. 6d. to 68s. 6d. per cwt.

* Chief Chemist and Technologist, Barratt and Co., Ltd.



The second report and accounts of the Sugar Board covering the year ending June 30 last, were presented to Parliament in October. During this time the free market price fell steadily with the exception of a short period late in 1958, and a deficit of about £23 million was incurred by the Board as a result of its purchases and resales of over 1½ million tons of sugar from the Commonwealth. This, together with its payment of over £10 million to the British Sugar Corporation, gave an overall deficit of £33 million, which was offset by the surcharge receipts of £34 million during the same period.

The sugar crop for the 1958-59 season has been estimated by the Food and Agriculture Organisation at nearly 49 million metric tons (raw value) which represents an increase of 10% on the 1957-58 season; this rise is attributed principally to favourable weather conditions in the majority of the producing countries. World consumption is increasing at the rate of about 5% per annum, and reached an estimated 44 million tons last year.

Cocoa and fat prices

Very stable prices have ruled for cocoa beans, which is a welcome change after the unstable prices situation of the last few years. For example, the spot price of West African beans has remained steady in the range of £276 to £289 per ton. The price of cocoa butter has dropped by about 1s. from 6s. per lb. at the beginning of the year to 5s. per lb. in September last.

Whilst this generally satisfactory situation has reigned for most raw materials, the high price of fats resulting from the sudden rise in the price in the autumn of 1958 has persisted throughout 1959. To take hardened palm kernel oil as an example (which rose from £125 to £150 per ton in the autumn of 1958), its price persisted in the range of £145 to £165 per ton during the whole of 1959.

Paperboard odour

Great concern has been expressed by the industry for many years at the continuing problem of odour derived from paper and board used in the packaging of its products. As long ago as 1954 a number of interested organisations, including the Cocoa, Chocolate and Confectionery Alliance, the British Food Manufacturing Industries Research Association and the trade associations representing the paper, board and printing trades met to consider the problem. A sub-committee was formed—the Joint Odour Subcommittee—as a result of that meeting and its task was to make recommendations for the elimination of the odours emanating from the printing of packaging material for foodstuffs. This committee submitted its report in the form of two booklets for guidance:

(*a*) "Odour From Printing Inks" which was published in 1955 and

(*b*) "Odour From Paperboard" published a year later.

The former booklet examined the general prin-

ciples and went on to consider five printing processes used commercially — namely the aniline, photogravure, letterpress, offset lithographic and varnish processes—and to make recommendations to obviate the problems associated with the retention of odour after the printing process.

This publication drew attention to the Draft Food Hygiene Regulations which had been prepared at that time by the Ministry of Food, which stated that people handling food are required to take necessary precautions to protect food from contamination and that "contamination" was specifically stated "to include contamination by odour." Also included was a suggested method for testing packing materials for odour.

In the view of many confectioners, little progress has been made since 1954 and many confectionery manufacturers spend a great deal of money and effort at their factories deodorising unsatisfactory supplies of packaging materials.

It was in the light of the limited progress achieved and the obvious need for a further co-operative effort that the Institute of Packaging organised a conference in October further to discuss the matter. At this meeting the urgency of the problem was again voiced by a number of manufacturers and the increasing trend towards prepackaging and the introduction of more varied and attractive forms of packaging had again put the problem in strong relief.

It was agreed that the subject should be re-opened by the appointment of a working party comprising representatives from the Research Associations concerned and of the supplying and using industries. It is to be hoped that this serious problem will now receive the attention it deserves.

Dental caries

Professor A. B. MacGregor, the Director of Dental Studies at Birmingham University, has been conducting a programme of investigation into the effect of various types of sugar and chocolate confectionery on the teeth, and he has contributed to the scientific literature on the subject "the disposition of different types of foodstuffs in and around the teeth after eating," (*Australian Dental Journal*, 1956, **4**, 195). He has also described his work on television and has produced a film dealing with the subject.

There appears to be very little solid scientific evidence at this stage to support the view that the consumption of confectionery is an important factor in the cause of dental caries.

Research is also being conducted at Vipeholm, in Sweden (B. Gustafsson, T. Sverig and Bläk, *Forb. Tidn.*, 1953, **45**, 51; C. Lundqvist, *Odontol Revy*, 1952, **3**, Suppl. 1).

Lead content limits

During the year the Ministry of Agriculture, Fisheries and Food have published a note in which are outlined their proposals for the regulations limiting the lead content of food. In August, 1954, the Food Standards Committee's Report on Lead was published. In the meantime the Ministry have considered representations from interested parties including the British Food Manufacturing Industries Research Association.

The proposals include a general limit for lead in foods other than "specified" foods of two parts per million by weight and the limits to be imposed for scheduled foods of direct interest to the confectionery industry are as follows:

Article of food	*Proposed limit in p.p.m.*
Dextrose and dextrose monohydrate	0·5
Edible oils and fats	0·5
Refined white sugar, with a sulphated ash content not exceeding 0·03%	0·5
Lecithin	5
Edible gelatine	5
Raw sugar, destined for conversion to refined sugar. All other types of sugar, sugar syrups, invert sugar, having a sulphate ash exceeding 1%	5
Edible molasses	5
Caramel	5
Liquid glucose, solid glucose and other starch conversion products with a sulphated ash content exceeding 1%	5
Cocoa powder (based on the dry fat-free substance)	5
Agar, alginates, alginic acid, carrageen, and similar materials derived from seaweed	10
Liquid pectin	10
Solid pectin	50
Flavourings	10
Food colours with the exception of caramel	20
Chemicals not specified in the British Pharmacopœia or the British Pharmaceutical Codex (Those chemicals specified in current edition of the above two volumes are controlled by the limits therein specified).	10

Arsenic

In the last review, the proposed regulations governing the occurrence of arsenic in foodstuffs, which were outlined in the Food Standards Committee Report on Arsenic, of January, were reported. On May 13, the Ministry of Agriculture, Fisheries and Food published the regulations and these came into effect on August 10.

Details of those goods of specific interest to this industry, covered by the regulations are given below.

	Arsenic limit expressed in p.p.m. by weight
Liquorice (dried extract)	2·0
Edible gelatine	2·0
Liquid pectin	2·0
Chemicals not otherwise specified but not including synthetic colourings	2·0
Solid pectin	5·0
Colours other than synthetic colourings	5·0 (calculated on dry colouring matter).

Gelatine

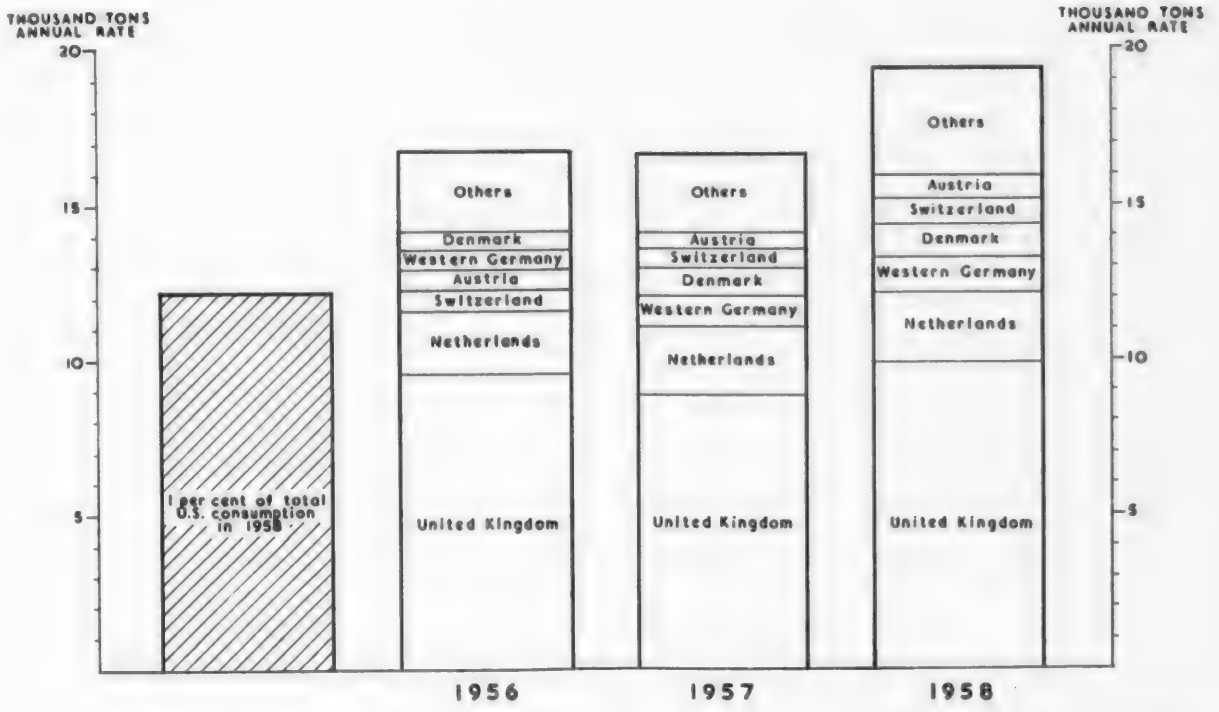
During the year the British Standards Institution have published a revised specification for the sampling and testing of gelatine (No. 757: 1959).

The principal changes incorporated in this revised specification are as follows:

(1) Three alternative instruments are named as suitable alternatives to the Bloom gelometer:

(a) The Boucher jelly tester, (Koprowski, *Analyst*, 1951, **76**, 732).

U.S. IMPORTS OF CHOCOLATE AND CONFECTIONERY 1956-58



(b) The British Glue and Gelatine Research Association (B.G.G.R.A.) jelly tester (Saunders and Ward, Proc. 2nd Rheol Congress 1954).

(c) The Food Industries Research Association jelly tester (Campbell, *J.S.C.I.*, 1938, **57**, 413).

(2) The specification stresses that when consignments undergo long delays in transit, the average moisture content may change between times of sampling by producer and consumer and recommends that, to avoid unnecessary dispute from this source, when jelly strengths and viscosities are reported, the results of moisture content determinations should also be given.

(3) A revised method for the determination of melting point.

(4) An alternative method for the determination of arsenic, namely that described by Eastoe and Eastoe, *J. Sci. Food Agric.*, 1953, **4**, 310, which is a colorimetric one based on the formation of molybdenum blue colour.

(5) In the case of the other heavy metals, lead, copper and zinc, new methods are recommended. For lead, the method is based on that described in the *Analyst*, 1954, **79**, 397-402, and that for zinc on the method of Strafford, Wyatt and Keshaw, *Analyst*, 1945, **70**, 232. A modification of the diethyldithiocarbamate method, in which the colour produced in the carbon tetrachloride solution of the copper complex is measured in the photoelectric absorptiometer, is used for the determination of colour.

In the foreword the difference between the terms "gelatine" and "gelatin" is clarified. "Gelatine" is reserved for the normal commercial product and "gelatin" for the soluble protein derived from collagen which is the main constituent of "gelatine."

Education

The increasing demand for more highly trained personnel in the industry is, in part, being met by the courses which lead to the City and Guilds of London Institute Intermediate and Final examinations in Chocolate and Sugar Confectionery Manufacture. Five institutes now provide these courses:

Borough Polytechnic, London.
Birmingham College of Technology.
Peel Park Technical College, Salford.
York Technical College, and
Langside College, Glasgow.

Research

At the annual general meeting of the British Food Manufacturing Industries Research Association, which was held in London on May 14, the annual report which was adopted included a summary of the year's research work in the confectionery field.

The Association's programme includes the study of:

(1) Sugar confectionery:
(a) drying of confectionery products;
(b) determination of moisture in confectionery products;
(c) measurement of the colour of glucose syrups;
(d) moisture equilibrium of corn starch;
(e) analytical methods;

(2) Cocoa and chocolate:
(f) volatile components of cocoa in relation to flavours;
(g) rheology of chocolate;
(h) glyceride constituents and stability of cocoa butter;
(i) detection of alternative fats in cocoa butter and chocolate;
(j) determination of lecithin in milk chocolate.

During 1958, the British Standards Institution set up a Technical Committee to consider the methods of analysis and examination of starch and its by-products. The interest of the confectionery industry in this matter lies in the fact that two of its important raw materials come in the scope of this valuable work; these are liquid glucose and thin boiling starches. The British Standards Institution is representing the U.K. in the work of the International Standards Organisation Technical Committee dealing with this matter at international level.

International meetings

The Technical Committee of the International Association of Sugar Confectionery Manufacturers held its fifth session at Lyons Charbonnier in France from May 4 to May 6, under the presidency of Mr. C. L. Hinton, late superintendent of research of the British Food Manufacturing Industries Research Association. The session was engaged in the continued study of analytical methods of importance to this industry and in assessing the practical laboratory work carried out on these methods since the last meeting.

The most important result of the conference was the decision that sufficient progress had been made to justify the publication of a volume containing details of the methods adopted and this should be available in the near future.

The General Assembly of the Association is held every two years and the sixth of these assemblies is scheduled to take place in Munich in June, 1960, at the invitation of the German Association. An excellent programme of lectures is being prepared covering many aspects of the industry.

FOOD MANUFACTURE
ANNUAL REVIEW

Pickles and Sauces

By J. R. Burrell

Consumer trends ★ processing methods ★ tomato ketchup ★ mayonnaise ★ treatment of frozen egg-yolk ★ mechanical mixing ★ ultrasonic homogenising

THE past year showed little change from the previous one as regards manufacturing trends and consumer preferences. Sales of the better-known products steadily increased, but whether this was due to rising demand for the particular type of product or at the expense of competitors, it is difficult to ascertain with certainty.

Sweet comminuted pickle in thick sauce, thick sweet sauces, tomato ketchup and salad cream, are still the most popular items, but the rest of the pickles and sauce products are still selling well although a great number of concerns are sharing the marketing and profits.

The higher standard of living exemplified in another direction by the incredible number of new cars, washing machines and other mechanical aids to "progress" now in being, also has its effect as regards food embellishments and trends, and while this actually has an adverse effect on sales of products that are used to make the very cheapest stable foods palatable, *e.g.* jams and marmalades, it has helped to increase the sale of those items required to "spice" the savoury foods more than ever available.

Increasing contact with the Continent and with U.S.A. service people has also helped to broaden the

scope of our native food appreciation so that items which in the past were only found in the better restaurants and hotels are now beginning to find their way into the private household.

Substitute products such as salad dressing are becoming less and less popular, and it would appear that the public has now been completely conditioned in certain aspects of degree of acidity, sweetness, blandness, etc., in such items as salad cream and tomato ketchup, so that deviations from these are not acceptable.

The ultra conservatism of British eating habits is very difficult to break down, but, as already mentioned, Continental and U.S. contacts are having their steadily eroding effect. The increase in the number of oriental restaurants show that these, too, must play some part, and it must be expected that the already available canned and bottled soy sauce and such items as bamboo and bean shoots, either with or without sauce, must have their effect.

Continental and, I believe, one native pack of pasteurised sauerkraut are being marketed, but sauerkraut is still far from being the major product that one would expect it to be. Apparently we still recognise cabbage as food only when it is presented in an over-boiled, soggy state, unless it happens to be of the dark red variety. Our simple cooking habits are the despair of lovers of good, but diversely prepared, cooked foods, and particularly as regards pickled foods, herring being in a similar position to cabbage.

Enormous quantities of pickled herring are despatched to the Middle East and to eastern European countries annually, and the methods of treatment, with or without vinegar, are legion in these parts of the world where cheap protein is scarce. In Britain there is a market for Bismarck herring and rollmops, but a very great deal of experimentation needs to be carried out in order to extend the shelf-life of these products, which otherwise undergo a softening process that, although having no effect on taste or odour, make the products inedible after a few weeks.

Here again the fish are available, and with spices, onions, cucumbers, etc., can be made into most attractive pickle packs, but the products need not only to be proof against softening but to be only mildly acid and correctly salted and seasoned.

The consumer preference for mildness of acidity in most pickle and sauce packs is continuing, and pasteurisation of mildly acid articles has become the rule rather than the exception.

Processing methods reviewed

The general methods and processes used in manufacturing the various popular pickled products are well known, but it might be useful to review some points, inattention to which may mar the product.

Tomato ketchup

The first consideration to bear in mind is that concerning the colour and flavour of the tomato purée itself. It should be sweet and full flavoured with no astringency or bitterness. The purée should stand up well to the heat of processing and pasteurisation, with minimum change of flavour and appearance. Manufacture should be so arranged that there is minimum heating in contact with acid and salt. This can be brought about by heating the vinegar and spices first, then adding the sugar, then the purée and finally the salt.

A very thorough but speedy mechanical mixing, using a type of mixer that does not result in air being taken up by the ketchup, is required. Homogenisation, if desired, may be carried out by the conventional type of homogeniser or by the ultrasonic machine. Filling should be as rapid as possible, as bulk heating leads to the browning and off-flavours that the process is designed to avoid at all costs.

Great attention should be paid to caps, as phenolic and other odorous compounds often used in preparation of the plastic liners may be present in excess amounts so as to give rise to odour and taste reminiscent of iodine and T.C.P. This is a fault in the manufacture of the cap-liners and should not arise, but it must be considered as a possible hazard that may cause complaints and return of the affected article.

Salad cream and mayonnaise

The first requirement is a good, bland, edible oil such as peanut, good quality soya, cottonseed, maize or olive. Peanut (arachis) is the most popular these days, but in fact any bland edible oil may be used provided it is not subject to rapid rancidity.

Treatment of frozen egg-yolk

Most manufacturers use the frozen yolks which present no danger to health when used in a heated, acid medium, but which can spoil batches of salad cream and mayonnaise if correct treatment is not given. The foreign yolk is assumed to be derived from hen eggs, but from the fact that water borne micro-organisms of the salmonella group are found to be a common infectant, it appears that ducks and possibly other birds supply a proportion of the total. Eggs in any case are liable to contain both pathogenic and non-pathogenic bacteria, and although the numbers originally may be insignificant in most of the eggs from which the can of yolk was derived, there may be some with large numbers of bacteria which have been distributed among the rest.

Freezing keeps the numbers from multiplying, but as soon as thawing begins the micro-organisms increase with incredible rapidity. Thawing is a slow process and begins, of course, from the outside, so that by the time the centre has become soft, the bacteria in the outer zones have increased enormously. This cannot be helped, but it is obvious that the process of thawing must be as speedy as possible and that the thawed material must be used immediately. If delays occur, the flavour is affected to some degree and toxins may be produced.

Between a good, clean-flavoured, freshly thawed egg-yolk and a foul smelling stale yolk, there are

infinite degrees of modification of taste and odour which will affect the finished salad cream. In hot weather or in warm conditions generally the off-flavours are developed much more swiftly than in cooler periods, but if it is at all possible it will be useful to devise rapid methods of thawing so that the frozen yolk may be drawn from cold store, comminuted in some way, *e.g.* by band-saw then mincer or bowl chopper, and within an hour or two put into malt or spirit vinegar where, after a thorough mixing (that here again must not result in air being taken up by the material) it may be kept without danger for a few days provided the acidity is kept at or above 3½%.

An occasional stirring is given to keep the surface from drying out, and it is covered in some way to prevent infestation by *Drosophila*. Since some heating also takes place in the process of manufacture of salad cream and mayonnaise there is no danger of multiplication of salmonellæ, which are destroyed when heated in a salad cream acid mixture at or above 140°F.

Pre-mixing of salad cream

In order to obtain a uniform emulsion in the finishing stage it is necessary that there should be a well-mixed cream prior to this, for pockets of oil present in the pre-mix will still emerge from the emulsifying machine as pockets of oil. These will be masked for a time by the fine emulsion surrounding them, but eventually they will become obvious in the jar.

To prevent any possibility of this occurrence it is necessary to ensure thorough dispersion of the oil phase in the matrix before emulsifying. This is brought about by having adequate movement of the water phase so that there is a good "convection" motion operating whilst the oil, in a thin stream, is taken straightaway from the centre of the container and dispersed evenly throughout the mixture.

Adequacy of the mechanical mixer

In order that dispersion may be thorough, the mixing machine, usually of the Silverson type, must give a strong enough surge so that the mixture is in movement throughout the batch. If this is not so, uniformity of emulsion will not be attained.

In a case where only a surface zone is in movement and the bulk of the mix is unstirred, there will be maximum oil in the upper part and minimum at the bottom. The remedy is to have a powerful enough machine that will give maximum movement to the mix when the shearing elements of the machine are situated well down in the mixing vessel.

This type of mixer is rapidly superseding the simple mechanical stirrer for many operations. Its intense shearing action is brought about by high-speed rotors of various shapes and design revolving inside a flat cylindrical box with apertures through which the mixture is thrown at high speed by the centrifugal force exerted by this action. The disruptive force in liquids and solids in suspension brought about by the shearing effect is used for a host of mixing, blending and comminuting operations. For instance, in salad cream alone it is used for pre-mixing, dissolving the stabiliser, mixing the egg-yolk, mustard and vinegar fraction and final mixing before homogenisation.

When purchasing a Silverson type mixer it must be ascertained that a machine of large enough capacity is envisaged, for if the machine is not strong enough to move the whole batch of product to be treated, it may be found that intensely sheared product may be masking untreated sections of the bulk which were too far from the functional parts of the machine to be drawn in and subjected to the shearing process.

The machine, which is, in effect, a modified centrifugal pump, may also be used precisely in this capacity as well as in carrying out its main mixing, dispersatory, blending, comminuting and pulping functions. It takes up very little room, and normally requires no more maintenance than a simple washing in hot water or detergent. On the whole it can be said that this mixer has provided the most useful adjunct to the pickles and sauces industry that has appeared in the last 30 years.

In the past the preparation of solutions of stabilisers has seldom been free of complications, for these materials are naturally prone to bunching when wetted. The aggregations of sticky matter so formed were very difficult to break down and often had to be strained off and thrown away. A thorough dry mixing with a large amount of a soluble material such as sugar or salt, prevented this agglomerating effect, but with this mixer, dry mixing is said to be unnecessary as a perfect solution is formed, in most cases, in a matter of seconds, after throwing the powdered gum tragacanth or other stabiliser on top of the agitated water or vinegar used as a solvent.

In cases where only a relatively fine emulsion is required, this may be obtained by the use of this kind of mixer alone, but in this case it is necessary to arrange not only that the machine is of sufficient capacity to "move" the whole batch during the emulsifying operation, but as a final precaution the pumping function of the machine should be used to pump the whole batch into another vessel so that every part passes through the machine's emulsifying head, leaving no coarse fractions on the side of the original container that might later act as nuclei for breakdown of the emulsion.

The emulsifying machine

The conventional machine is in effect a powerful pump which forces the thoroughly mixed oil and water phases of the mixture through a very small but adjustable aperture between a shaped and spring-loaded piece of stainless steel and its seating. Since the shearing effect so obtained is designed to break up the oil globules into others of microscopic size, it is obvious that the clearance between the piece of metal and its seating must be uniform around its shape, usually conical. This means that a careful watch has to be kept on the resultant emulsion, and

replacement or re-grinding of emulsifying parts has to be made if these are at all worn.

The C.P. Equipment Co.'s machine in which a cone formed of compressed, stainless steel wire that is replaced fairly often, is an example of a cheap and extremely efficient method of overcoming this problem of wearing of a vital part. The machine should be cleaned with hot water immediately after use, and the detachable valves and other parts should be dried before replacement.

The ultrasonic homogeniser

This machine is claimed to have many advantages over the older types.

The homogenising effect depends on the use of accoustic energy to produce cavitation forces of some 60 tons per sq. in. in a flat stream of the mixture to be treated. Its comparative simplicity and workmanlike construction commends itself to many. The pump, of special construction, is powered by a two-horse power motor only, in the standard production machine, and the functional parts are simply a pump and a vibrating element.

The latter is made up of a delivery jet base, an adjustable jet mechanism, an insert to produce a flat stream, a vibrating blade and a resonant bell surround. The cavitation effect is produced when the flat stream of the liquid to be homogenised or emulsified impinges on the blade accurately set in its path and thus causes vibrations of a frequency of 20 Kcs./sec. so translating the cavitation forces into a rending of globules of oil and pieces of solid. The degree of emulsification or homogenisation achieved is said to compare favourably with that brought about by other types of machines, and the output of the standard machine is approximately 300 gal. per hr.

"Food Poisoning" up to date

In this reviewer's opinion, "readability" is a cardinal requirement in a book on food poisoning obviously intended as a source of information for readers with diverse scientific and technical backgrounds.

The author is to be congratulated on maintaining this desirable feature in the fourth edition of his volume. Sir Arthur MacNalty acknowledges this achievement in his foreword when he states that he "has assembled his collated facts in a readable and succinct form."

The third edition, published in 1950, comprised just over 300 pages; this new edition runs to over 400, and moreover includes almost 950 full references to the literature of the subject. Dewberry's book therefore provides an excellent entrée to this vast and rapidly growing field of research which should prove invaluable to those many scientists who, from time to time, have occasion to familiarise themselves with aspects of the topic varying from poisonous fungi to the minimum salt concentration inhibitory to *Clostridium Botulinum*.

Some of his documented statements, are, in this day and generation, alarming and deserve wide publicity, and more! For example, he quotes Thornton (1957): "It is beyond doubt that many animals suffering from illness of an acute febrile nature are slaughtered in an attempt to market the carcass. . . ." One confesses to being disgusted by this state of affairs.

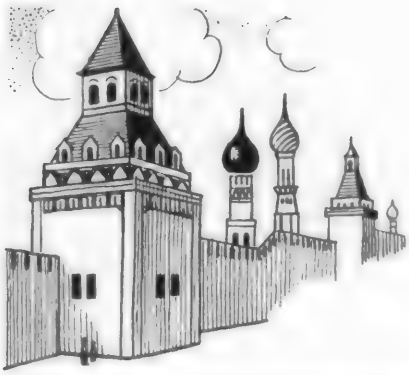
Again, the frequency with which Walker (1957) isolated salmonellæ from organic fertilisers purchased from shops (40% of the 123 samples he examined) surprised us. Both Thornton and Walker's data, since they are both British authors, presumably apply to this country. Dewberry undoubtedly interprets his terms of reference, as an author, in the widest possible sense; on page 169 he gives Cruickshank's recipe for a hand lotion formulated to keep the skin of the food industry worker's hands "healthy and whole!" This reviewer does not feel competent to comment on the efficacy of the formula quoted, but does feel obliged to doubt, on æsthetic grounds, the advice of the Greek physician Dioscarides Pedanius who apparently considered edible fungi to be indigestible, and as a precaution against "mistakes" advocated rounding off the meal with an emetic!

With one or two assertions one can hardly concur. Surely glucose is hardly to be regarded, these days, with "serious objection" nor described "as an admixture or an adulterant" (page 190), nor are we very keen on asphalt as a flooring in a food factory.

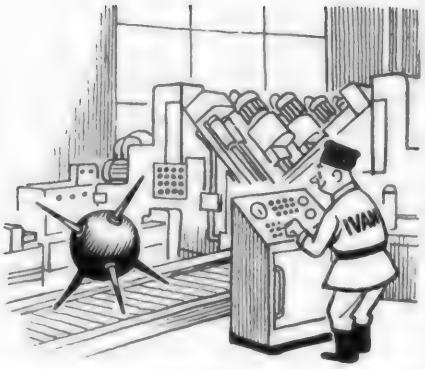
If one has to criticise, and an honest reviewer is obviously required to state his views, one's feeling is that perhaps the historical aspect of food poisoning is accorded space which might be more usefully employed in discussing more fully the important subjects of detergents and quaternary ammonium compounds, and clarifying the mode of expression of swab tests on washed crockery. After all, over four pages are devoted to recounting the largely German speculative work on the causation of botulism which is now of no importance, apart from its historic interest.

The critical comments one has ventured to make detract to a very minor degree only from a thoroughly readable volume, crammed with information on a vast, important and expanding subject. Every chemist, bacteriologist, food consultant, catering manager, chef, public health inspector, medical officer of health, epidemiologist and many others engaged in the food and catering industries, will want their own personal copy of this valuable book.—E. L. E. Humphriss.

* *Food Poisoning*. By Elliot B. Dewberry, M.B.E., F.R.S.H., F.R.I.P.H. Leonard Hill (Books), Ltd., London, 1959. Pp. 436. 45s. net.



Food in Russia



Russian Fish Research

By C. L. Cutting,* B.Sc., Ph.D., F.R.I.C.

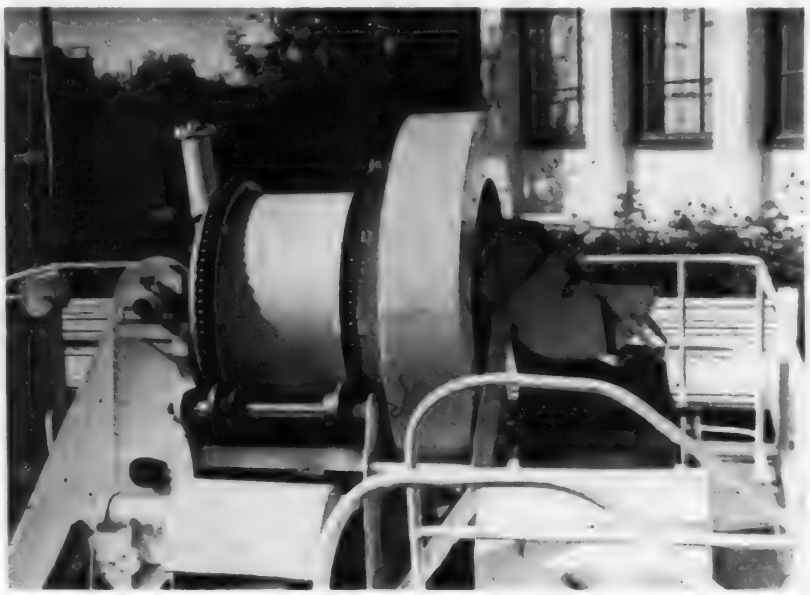
When the author attended the meetings in Moscow during September 3-9, 1958, of Commission 4 of the International Institute of Refrigeration, he stayed on in the U.S.S.R. for a further two weeks, visiting various research establishments and fish factories in Moscow and Leningrad. This article summarises some of his impressions.

THE target figures for the Soviet Seven Year Plan announced by Mr. N. S. Khrushchev in November, 1958, indicate an annual fish catch of 4,626,000 tons by 1965; and it is stated that "the greater fish catch is to be attained by developing new fishing grounds on the high seas and oceans, by the wide use of ponds, lakes, rivers and reservoirs," and that "the capacities of cold storages for keeping foodstuffs will nearly treble." The ambitious character of this plan is shown by the following table:

year	*tons of fish caught*
1913 ..	1,050,600
1930 ..	1,282,700
1940 ..	1,404,000
1945 ..	1,125,200
1950 ..	1,755,000
1955 ..	2,700,000
1956 ..	2,848,900
1958 ..	2,850,000 (provisional)
1960 ..	4,200,000 (previous 3-year plan)
1965 ..	4,626,000 (new 7-year plan)

Russia already has the second largest share, next to Japan, of the world fish catch, which at present totals about 30 million tons a year. Britain, by comparison, comes about seventh, with a catch of about 1 million tons, the same as in 1938. The ratio of fish to meat consumed is much higher than in the U.K. (perhaps about 1:2, cf. 1:7 in the U.K.), but *per capita* consumption of both is still well below that of the U.K.

There seems little doubt that the Russians will in the foreseeable future require all the fish they can catch for themselves, as well as continuing to import all they can. The remarkable rate of growth registered in the table has been aided by the intense prosecution of scientific research on both fish catching and processing, and the prompt and wholesale application of its results. There appears to be close integration between the various institutes working on similar problems and the industrial establishments, factories, ships, etc., where new methods are being given large-scale trials.



A machine for mixing salt with fish on display at the permanent All Union Agricultural Exhibition, Moscow.

* Officer-in-Charge, Humber Laboratory for Research in Fish Technology (United Kingdom Department of Scientific and Industrial Research), Hull.

The Russians fish in all the seas round their coasts, including (according to 1956 figures) the Baltic (200,000 tons) and the Barents Sea (800,000 tons) in the north, the Okhotsk Sea in the Far East (700,000 tons) and the Black Sea (150,000 tons), Caspian (400,000 tons), Sea of Aral and Lake Baikal in the south. They also fish a little for herring in the North Sea. They have even been as far as Takoradi, in West Africa, with an experimental freezing ship (the *Kazan*) for trial catches of *Sardinella aurata*. Later, a factory freezing vessel had sailed there again from Murmansk, and 600 tons of fish were taken back and canned as sardines.

Cod and similar species with about 800,000 tons and herring and similar species, 800,000 tons, are the chief types exploited. Fresh water fish amounted to 660,000 tons in 1956 and salmon to 200,000 tons.

The distances involved in such a large country (*e.g.* Moscow to Vladivostok 15-20 days, Murmansk to Leningrad 6-8 days), obviously mean that much reliance must be placed on methods other than chilling in ice; hence, the rapid expansion and magnitude of the fish freezing industry, which produced about 428,000 tons in 1956, out of a frozen fish products world total of 1½ million tons, in which Japan comes second with some 300,000 tons and the U.S.A. third with about 100,000 tons. Salt curing, too, is still a most important process, although even here the taste for salted products is declining. Miscellaneous salted and cured products amounted to 500,000 tons in 1955, and salted herring, etc., to over 300,000 tons. Nearly 70,000 tons of fish were smoked out of the F.A.O. recorded world total of 250,000 tons, more than in any other country. In addition nearly 500,000 tons of fish were canned, and production rose more than threefold between 1950 and 1956.

Fresh fish distribution

Trawlers of 100 to 600 tons land at Murmansk with fish up to a maximum of 15 days in ice, although 12 days is more normal. This fish is graded by government inspectors (one in each factory, except in the case of small factories), who allocate fish to various uses, under the direction of the Ministry of Trade. The standards used seem to be chiefly sensory, assisted by physical and chemical tests. Fish that will not stand up to transport by rail to reasonably accessible centres of population is salted.

Dr. C. L. Cutting (left) with Madame G. Noskova (centre), head of the Bacteriological Laboratory at V.N.I.K.H.I., and Mr. I. I. Adamovski (right), director of the Dehydration and Canning Research Laboratory, Moscow, and two other lady bacteriologists.

Freezing

Russia has a long history of natural freezing and freezing at sea, starting with non-powered barges at Astrakhan and on the Yenisey more than 50 years ago. Of the 428,000 tons of fish frozen in 1956, about 50% was frozen on board fishing vessels and floating factories.

The total capacity of refrigerated holds of fishing vessels in 1957 was 180,000 tons, while the total capacity of fish cold stores on shore was 150,000 tons. The total freezing capacity of the refrigerated vessels was 2,800 tons per 24 hr.; and that of shore installations 1,900 tons. There are now about 20 of the *Pushkin* class factory freezing trawler, which is similar to the pioneer British *Fairtry*, and they are building 40 more of an improved *Mayakovsky* class, with a total of 90 or 100 as the present target.

On the Caspian Sea, small sprats caught increasingly by a combination of electric lights and pumps, on smaller vessels of 120 ft. or so in length, are cooled in chilled sea-water and frozen in blocks.

The total amount of fish frozen on vessels is planned to rise to 900,000 tons by 1965, *i.e.* almost as much as the entire British fish catch. The plan is to increase the daily fish freezing capacity to 8,900 tons, out of a total for all commodities of 27,000 tons, by 1965. Obviously they will then be capable of freezing practically their entire fish catch. Considerable efforts are being made to mechanise fish freezing and thawing on sea and land.

Cold storage

Most frozen fish is cold stored at −18°C. (0°F.), although new cold stores are equipped to go to −30°C. (−22°F.) and it is recognised that fatty fish require such a low temperature. There is a very large (35,000 tons capacity) mixed cold store in Moscow operated on the jacketed principle for which the results of experiments are given to show that it reduces dehydration by 50 to 60%, and, by the aid of electronic controls, maintains temperatures very much more constant than was previously the case by hand control. The principle is, of course, well known, and has been tried out in Canada, although not in anything like such a large installation. This plant is still largely experimental, and the results obtained will determine future policy.

Transport

There are 75 specially refrigerated trains of 20 freight cars of 30 tons each capable of running as low as −12°C., with diesel electrically driven compressors cooling circulating brine through pipes as a secondary refrigerant. Forty-five tons of dry ice sent to Vladivostok through temperatures as high as 47°C. in Central Asia in one of these trains lost less than 1·5% per day on a 15 days' journey.

There are also 27,000 ordinary refrigerated freight cars of the old type in existence, each bunkered with 5 tons of water ice, mixed with salt for low temperatures. Natural ice is used for bunkering. 20,000,000 tons of this are made annually by a mechanised process, requiring only one man per 100,000 tons.

Fish processing

Fish is brought to a large central factory in Moscow employing some 2,000 workers, with a production of 80 tons per day of cooked, marinated and smoked fish, etc., distributed daily to fulfil orders from the 40 Moscow fish shops, and numerous mixed stores. In addition, frozen fish, etc., is distributed so that the total fish supply handled is about 400 tons per day.

There is another small plant elsewhere, but it is planned to build another factory the same as this. At Leningrad there is a similar factory. At Astrakhan the Mikoyan fish factory employs 5,000. At these factories experimental processes developed at the refrigeration, fisheries and other research institutes are given large-scale commercial trials.

Fish smoking

The Moscow combined fish factory, amongst other operations, smokes a variety of fish, from Caspian sprats and Lake Baikal and North Sea herring to various species of sturgeon, totalling some 60 tons a day. Both hot and cold smoking is practised, and cod and redfish are treated in several ways. There is nothing at all similar to our finnan and kipper. All the fish

In this picture are, from left to right, Mr. Bazaev, Director of Moscow Fish Factory, one of the full time English translators at V.N.I.K.H.I. (All Union Refrigeration Research Institute, Moscow), Mr. A. Piskarev, head of fish products research at V.N.I.K.H.I., and the Manager of Moscow Fish Factory.

is smoked in primitive mechanical kilns of two main types, one depending on air movement induced by a chimney fan, and one, used for sturgeon, in which the fish travels round the kiln. The production of smoked fish is planned to rise to 100,000 tons, with an additional 50,000 tons for canning.

There is considerable interest in electrostatic smoking and experimental plants are in operation at Kiev, Leningrad and Astrakhan, in which up to 8 cwt. of small fish are smoked and dried in 42 min., using infra-red heating.

Also in operation on a pilot scale in the Moscow fish factory is a dipping process substitute for smoking, followed by infra-red drying. The dip is produced by scrubbing, concentrating and washing smoke distillate. It is claimed that by this process smoked products can be practically freed from the traces which occur in smoke of chemicals capable of producing cancers. However, some workers did not think that such dips resulted in a product of satisfactory flavour.

Dehydration and canning

Vacuum cabinet dehydration is in commercial operation at Kaliningrad for Baltic cod and at Rostov for "Sudak," a smallish, non-fatty fish. The process is regarded as of great value in distributing fish to inaccessible parts. The plan for fruit and vegetable dehydration is to cope with an input of 1 million tons a year.

In addition to caviare, which is "pasteurised," many fish including cod, are canned in floating and shore-based factories for home consumption and, of course, crab and salmon for export.

Retailing

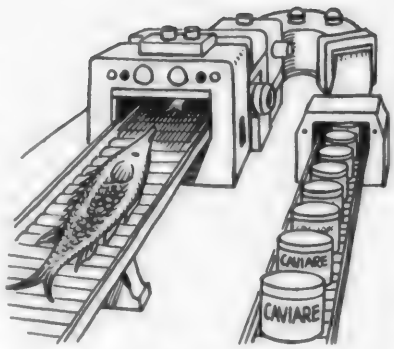
Fish is sold in Moscow in large stores, of perhaps 50-100 yards of counter length, which, like all shops, are very crowded and can hold as many as 500-1,000 people. Fish is usually displayed on refrigerated counters, designed and tested by the Refrigeration Research Institute. British and Icelandic frozen fish are on sale at 7r. 70k. per kg. (*i.e.* about 3s. 3d. per lb. at the tourist exchange rate of 27·6r./£). Sturgeon is 25r. per kg. and red herring 19r. 20k. per kg. Meat by comparison appeared to cost about 15r. per kg. Fish in Moscow and Leningrad shops comes frozen from as far as Kamchatka.

Fish meal

Fish meal is usually only made from fish waste or very small fish, and only occasionally is edible fish used. The *Pioneer* class trawlers, built in Lowestoft, carry their own fish meal plants. The plants, which are mostly situated outside large towns, are chiefly of cook-and-press type.

Mechanisation

Great attention is being paid to increasing output per man by mechanising heavy manual processes, *e.g.* hauling drift and shore seine nets; shaking pelagic fish out of the nets; and the salting and packing of fish in barrels on the vessel. Machines are designed and constructed in the laboratories. At Murmansk, the unloading of vessels is facilitated by machinery, and the use of nylon nets enabling 300 kg. to be removed at a time.



"—fish processing."

Education

There is a considerable amount of fisheries technological education in the Soviet Union. There are three special institutes, or high schools, producing highly qualified specialists for the three sections of the fish industry—namely, fish biology, fish catching and fish technology. In addition there are many technical schools producing technicians. There are also correspondence schools and further educational institutions producing skippers and personnel for the fishing industry.

The three high schools are the A. I. Mikoyan Technical Institute of Fisheries and the Fish Industry in Moscow (although since "decentralisation" this is in the process of being moved to Kaliningrad) where there are 1,500 students, the Astrakhan Technical Institute of Fisheries and the Food Industry, where there are at least another 1,500 students, if not more, and the Far East Technological Institute of the Fish Industry at Vladivostok where there are approaching 1,000 students. Study at these high schools is pursued under the faculties of ichthyology, fish breeding, fish catching (*i.e.* fishing vessels, etc.), fish industry, technology, mechanical engineering, construction, shipbuilding, economics, refrigeration, etc.

In each year class at each high school there are between 25 and 50 students in each faculty. The course lasts 5 years. The students enter at age 17 to 18, they spend two years on general education and then specialise. All students spend some time in production centres for training purposes. More stress is being laid on correspondence courses at present, of which there are branch centres of the Central Correspondence Institute for the Fishing Industry in Astrakhan, Rostov, Vladivostok, Murmansk and Riga.

This educational system is now 46 years old, but has obviously been considerably expanded and developed in more recent years. At Moscow there are some 200 lecturers, mostly full time. These spend about half their 6-hr. working day on the average in lecturing and half in research. Some of the staff of the research institutes give part-time effort to these technical institutes.

The All-Union Industrial and Agricultural Exhibition in Moscow includes an extraordinarily well arranged and comprehensive permanent pavilion devoted to the fish industry, with many excellent models and charts. Full-scale pisciculture ponds are available for study. There are competent demonstrators in attendance to explain everything from fishing gear to new methods of smoking and drying. There is a full-scale drifter deck to demonstrate labour saving equipment. Full-scale machinery for grading fish for size, for packing fish in cans and for cracking the legs of king crabs to extract the meat are available for demonstration.

Administration

Since the decentralisation measures of a year ago, the Ministry of Fisheries has been abolished and its activities incorporated in the State Planning Commission (GOSPLAN) and integrated with the new Regional Economic Councils (Sovnarkhozes) under the former Minister of Fisheries, Mr. Ishkov, who has visited Britain and Canada.

Research and development

Two thousand persons, of which 800 are scientists, are employed in research on fisheries, biological, technical (*i.e.* vessels and nets) or technological, under the All Union Institute for Fisheries and Oceanography (V.N.I.R.O.). There are 120 people in the technology section, which spends about 15% of the total budget. Including workers at other institutes, such as the Refrigeration Research Institute, some 500 are involved altogether in fish technological research. Since "decentralisation" the fishery research work also has been largely transferred to branch laboratories on all the main seas. Thus, fish bacteriology is now carried on only at Leningrad and Vladivostok. The Polar Institute at Murmansk employs 120 people, mostly on biology, and possesses a library of 20,000 volumes, and 40 vessels. Most of the fish canning research appears to be carried out at the V.N.I.R.O. Institute at Riga, in Latvia.

Each Institute is administered by a scientific secretary whose functions seem to include attending to publication of results.

The Director of Scientific Research is Mr. V. P. Zaitzev, himself a technologist, who is the author of at least two books on fish freezing. Mr. N. A. Voskresenski, who is head of technology section, has written a book (1st Edition, 1953; 2nd Edition, 1958) on the "Technology of drying, salting and smoking fish."

The V.N.I.R.O. Leningrad Laboratory, called Institute for Mechanisation of the Fish Industry, is under the direction of Mr. Konokotin, who has visited this country.

A total staff of about 50 there is engaged in work on antibiotics and fish, engineering aspects of electrostatic smoking, etc.

Refrigeration Research Institute, Moscow (V.N.I.K.H.I.)

The Director, Ch. Kobulashvili, and Assistant Director, D. Rutov, were hosts at the meetings in Moscow in September, 1958, of the Commissions 3, 4 and 5 of the International Institute of Refrigeration. The Institute was founded in 1930 and entered its present building in 1935.

Some 330 people, including 185 scientists and engineers, are working in 16 sections on research (including microbiology, biochemistry and engineering application, design and testing of performance of industrial and domestic equipment).

All foods are studied at temperatures down to −50°C. (−60°F.), and it is planned to go down to −100°C. (−150°F.).

An excellent summary of the work of this Institute has been given in English by Mr. W. B. Gosney in "A Review of the Moscow meetings of the International Institute of Refrigeration" issued by the (British) Institute of Refrigeration, December, 1958. There is also a Leningrad Institute of Refrigeration.

As a link between the V.N.I.K.H.I. research institute and industry there is the Central Designing Bureau of the Refrigerating Machine Building Industry and an Institute for Construction of Establishments for the Refrigeration Industry. Another body called Orgproekttechmontag (Organisation for Mounting Technical Constructions) is involved in designing commercial fish freezing installations. All these organisations link up with V.N.I.R.O. on fish freezing projects.

There is also close contact with such institutes as The Central Scientific Research Institute of the Canning and Vegetable Dehydration Industry (Director, I. I. Adamovski) employing about 220 workers, the Meat Research Institute employing 200 workers (Director, V. Gorbatov) and the Institute for Mechanisation and Economy in the Use of Food (Director, Fishilov), where 300 people work, and smoke dips are under investigation.

To conclude, the general impression was gained that although a good deal of effort is being devoted to scientific research in refrigeration and fisheries, the U.S.S.R. has made no startling discoveries that in any way outdistance British achievements in the same fields. However, the really significant difference between Britain and Russia is the spectacular scale of application of known principles and existing scientific facts, particularly in the field of fish freezing. These developments appear to be facilitated by the fact that scientists and industrialists are both government servants so that there are fewer barriers to the adoption of new techniques.

The Russians are quite familiar with British and foreign work, which their own staff translate. Furthermore, they are very friendly and anxious to make contact with their British counterparts.

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How Russians solve Fat Storage Problems

By W. G. Cass

Continuous process butter

AS is well known, butter made by the continuous process shows a finer plasma distribution and lower bacterial count ("plant") than that made otherwise. Both these features increase its stability; but the question arises: what is the optimum cold storage temperature for such butter?

The problem has been investigated by the V.N.I.I.Kh.P. (All Union Research Inst. for Refrigeration Ind.), and results reported by Yu. Olenev (*Kholodn. tekhn.*, 1959, **3**, 55-57). He notes the unsatisfactory condition of some of the butter sent for cold storage, *e.g.* in the matter of consistency, and briefly discusses the reason. With falling temperature certain defects in consistency are apt to be more marked as the glycerides (lactic) content declines (see author's earlier article, *ibid.*, 1958, No. 1), *e.g.* down to 3-6% at −18°C.

Cold storage temperatures hitherto have been usually from 0 to −7° or sometimes down to −10°. In 1956-57 the Institute undertook some experiments in butter storage in this lower range. Both summer and winter butter from four factories in the Cherkassk region (Ukraine) was tested, with the cows under special feeding conditions: in winter and spring their rations included cake (Russian *zhom*, which literally means press), especially sunflower seed cake, silage and chaff; and in summer a varied range of greenstuff.

The butter was made from high-fat cream under different conditions of cooling (see *loc. cit.*, No. 1); also a certain amount of sweet cream unsalted and *lyubitelsk* (amateur or fancier) butter. All were made from cream of the same quality. Samples were stored for 12 months (non-continuous or batch types) at −5, −10, −14 and −18°C.; and the continuous for 9 months.

This latter (continuous process) was of winter or summer make, and was found to be more stable in cold storage than the other kinds. The summer product was more stable than the winter one. At the temperatures of −10, −14 and −18°C. the continuous process butter was practically unchanged in quality after 12 months.

A temperature of −12 to −14° is recommended as a general safe average, and is quite low enough; in fact, at a lower temperature certain defects may arise. But batch

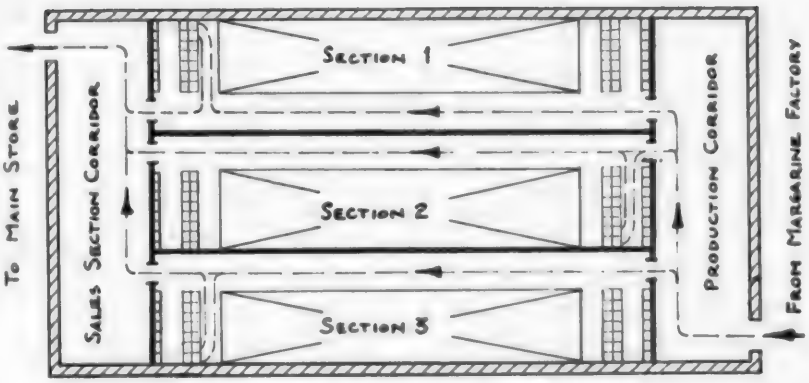


Fig. 1: Sectional store.

butter is better at $-18°$. Quality was measured by marks (or Russian *balli*) that ranged from 40 to 45. Decline in quality (tabulated) during storage for 3, 6, 9 and 12 months, ranged from 0 to 3·7 marks, the maximum being shown by the amateur summer butter after 9 months at $-5°$.

The chemical characteristics of the continuous process butter showed greatest change in the period from completed manufacture to beginning of storage, as one would expect, for during that time it was exposed to temperatures of 8° to 0°C. Acidity increased, as also the plasma amine number, whilst the peroxide number remained with little change. However, there was no appreciable relation between the extent of the chemical changes and storage temperature.

Margarine

Total production of margarine in the Soviet Union in 1958 was 396,000 tons (448,800 tons 1957), of which the Federated Republic (R.S.F.S.R.) accounted for 238,680 and the Ukraine 82,200 tons. For the first quarter 1959 production in the R.S.F.S.R. was 80,300 tons. Production of Salomas (Russian hardened or hydrogenated fat), largely used for margarine, was also less in 1958, *i.e.* 542,560 as against 603,850 tons in 1957. Although there was some decline, it is claimed that practically all the margarine and fat-hardening factories reached or somewhat exceeded the planned outputs.

At the same time, in 1958, some attempt was made to improve quality and extend the variety range. For example, in the R.S.F.S.R. the manufacture of chocolate margarine was established, having a very attractive flavour; also a new baking fat with 17% of phosphatides. Some attention is being given to the study of crude phosphatide sources, with a view to improving quality, extending variety and range of use.

Some difficulties appear to have arisen lately in regard to what is called factory storage (*tsekhov. sklad*) of margarine and inspection. Writing in the Russian Oils and Fats journal (*Masloboino zhir. prom.*) for June, 1959, Eng. V. V. Vasil'ev refers to the official inspection and certifying to which all margarine must be subjected; and states that this, including chemical analysis, organoleptic examination, etc., takes no less than 8 hr., during which time the goods must of course remain on the factory premises. This leads to the various inconveniences herein described.

In order to remove these it is proposed that the factory storehouse should be arranged in sections, as shown in Fig. 1 herewith. Production of one day or shift should go to Sect. 1, insulated from the Sales Store (*otdel cbyta*); that of the following day or shift should go to Sect. 2. Meantime the goods in 1 have been examined and certified, if up to standard, and passed to Sales. The third day's output goes to 3, whilst that of 2, similar to 1, is certified and also goes to Sales. Sect. 1 is now free for a further lot, and so on.

In order to avoid unnecessary movement of stock, when the works store is located near the main store, it was decided at a recent meeting of directors of the Gor'ki Oils and Fats Trust to combine these two store-rooms and divide the main one into sections

(*Concluded on page 33*)

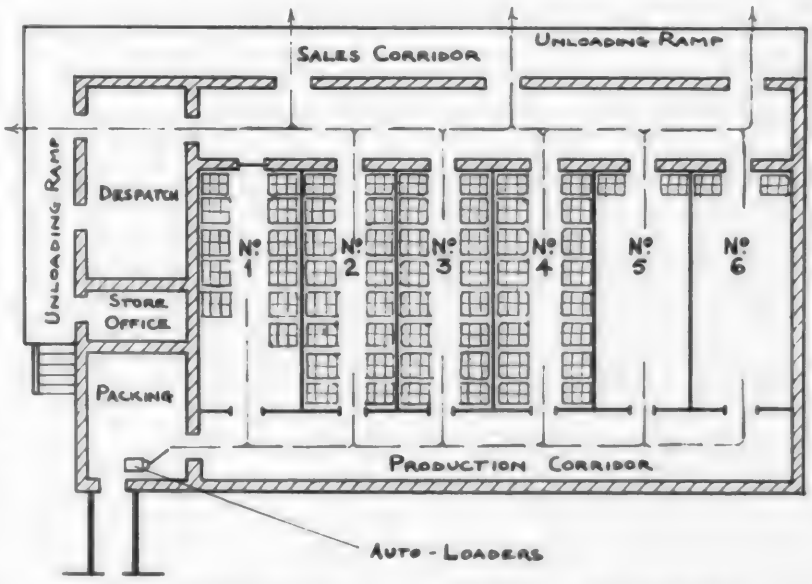
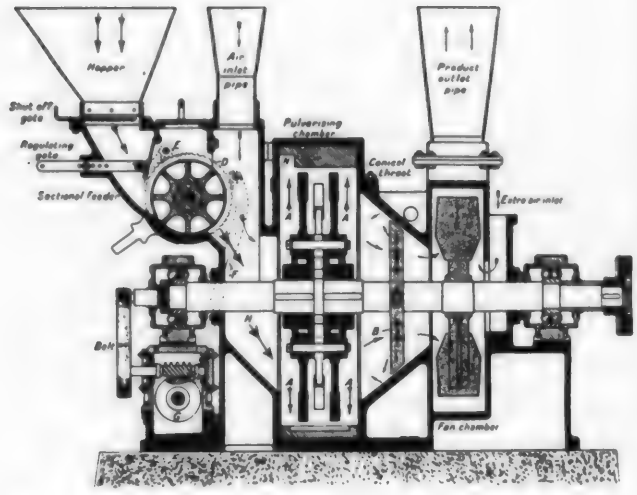


Fig. 2: Combined refrigeration store (works sectional and main store).

FOOD MANUFACTURE reviews

Machinery for GRINDING, MILLING and SIZE REDUCTION



(*Above*): **Sectional view of the nos. 3, 50 and 51 Impax pulverisers made by International Combustion Products, Ltd.**

Have you a grinding problem? One of these suppliers may help you.

Alexandra Separator Co., Ltd.

The *Dakmi* grinding mill supplied by this firm is specially designed for milling fodder cake, meat and bone meal, dried bones, etc., into a fine powder. It is a complete milling plant and does not require any auxiliary apparatus. It is equipped with an electromagnet for removing pieces of iron. It accepts cakes up to 10 in. wide; larger pieces must be broken down. The cakes pass a set of breaker rollers and fall into a milling drum (past the magnet) where the material is ground to the required fineness so that it may pass out through interchangeable sieves directly into a collecting bag. There is an air circulation arrangement to prevent dust formation in the room.

Capacity is between 1,500 and 2,500 lb./hr. depending on the quality of the material. The use of an 18 to 20 h.p. motor is recommended, because of the unavoidable unevenness in the feeding, although the electricity consumption never exceeds 9 Kw.h. per hr.

Apex Construction, Ltd.

This firm manufacture cutter mills (range no. 116), vibratory ball mills (range no. 163), and comminuting mills. The cutter mills are claimed to be suitable for the grinding of fibrous and similar materials, such as beet pulp, cereals, cocoa nibs and gelatine. Size reduction takes place by a shearing action and not by impact, which is claimed to result in a remarkably uniform product with economical power consumption and absence of changes in the material arising from loss of moisture.

The ball mills operate on a new principle by which the balls, instead of cascading through rotation of the mill, are subjected to a vibratory motion. As the frequency of vibration is high, the balls rapidly subject the material to impacts, and at the same time rotate in a circular motion. It is claimed that materials can be pulverised to 1 micron size, size reduction is more rapid, and materials which resist disintegration down to impalpable sizes by other means are now capable of such size reduction.

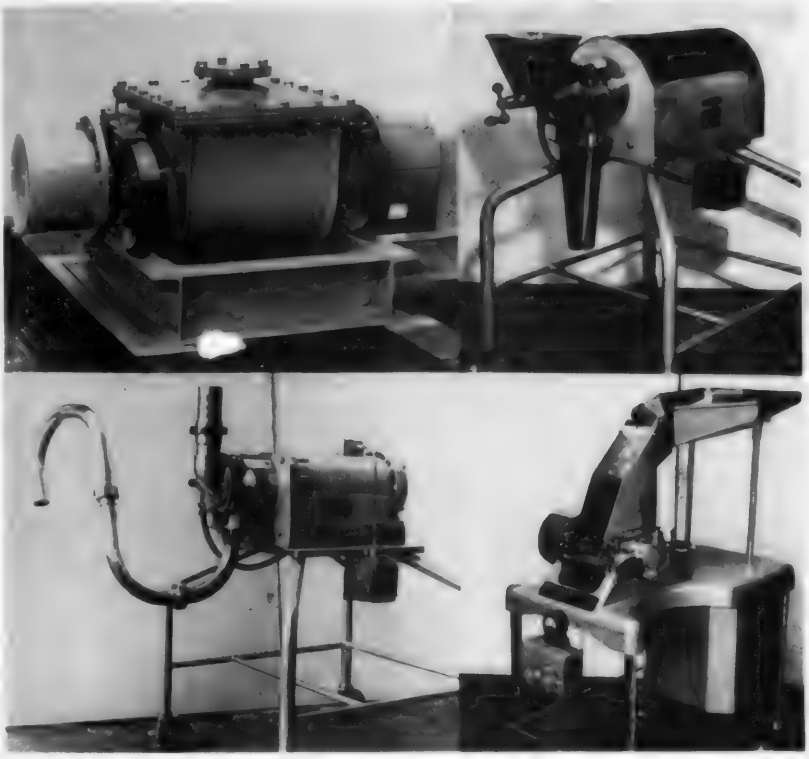
The comminuting mills are available in 5 sizes with many different models for varying applications. Uses include the production of whole fruit drinks, breakfast cereals, instant coffee, biscuit manufacture, and preparation of vegetables for soups and baby foods. The machines are of stainless steel and are said to be easy to clean and sterilise and to have high outputs.

The smallest model is the no. 160, suitable for small scale production and laboratory work. The no. 151 *Homonutor*, a sister machine, is, so the makers say, widely used for emulsions and suspensions, and its applications include the processing of sauces, mayonnaises and similar products.

The latest addition to the range has been developed for the size reduction of heat sensitive materials under controlled temperature conditions. The grinding chamber and feedthroat are completely water jacketed, and the mill is normally driven by a 5 or 7½ h.p. totally enclosed motor. Three rotor speeds up to 5,000 r.p.m. are standard, but higher speeds up to 10,000 r.p.m. can be provided.

Baker Perkins, Ltd.

This firm's triple horizontal plate cocoa liquor mill is claimed to provide a high output from a small floor space, an increased number of grinding passes and complete control of fineness at all stages. The product is ground between specially designed hard



Apex machines. (*Top, left*): **Vibratory ball mill no. 163.** (*Top, right*): **Comminutor junior no. 160.** (*Bottom, left*): **" Homonutor " no. 151.** (*Bottom, right*): **Comminuting mill no. 114.**

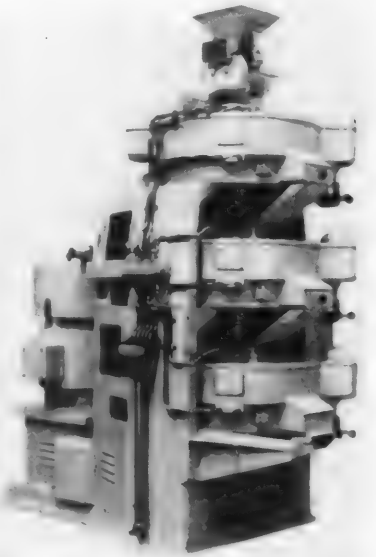
metal grinding plates. Each grinding head employs 4 grinding discs, the outer pair of which are stationary and the inner pair mounted on either side of a rotating disc.

The nibs to be ground are fed to a nib feeder mounted at the top of the machine. This is provided with a pair of magnets for extraction of tramp iron and a pair of grooved rolls running in conjunction with adjusting slides for regulating the feed. The nibs are dropped into a tube forming the casing for a feed worm which pushes the product down into the feed openings of the plates. This tube is easily detachable for cleaning.

The machine can be supplied without the nib-feed to provide for feeding with pre-ground mass.

The liquor is discharged from the front of each grinding head and is guided by chutes so arranged that it runs through each of the three heads consecutively. The liquor chutes allow for samples to be taken from both the top and bottom of each grinding head.

The water cooling system is provided with an individual needle valve for each grinding nib and the water outlets are visible.



Baker Perkins triple horizontal plate cocoa liquor mill.

W. S. Barron and Son, Ltd.

A recent addition to the range of impact mills made by this firm is the no. 7, which has been designed for those requiring a very high output from a single mill. Motors of up to 150 h.p. can be used, giving an output comparable with three no. 4 impact mills each of 50 h.p.

Product fineness is governed by the mesh size of 6 screens separated by grinding plates. The screens are made of flexible high carbon steel and can be inserted or withdrawn, if necessary, while the mill is running.

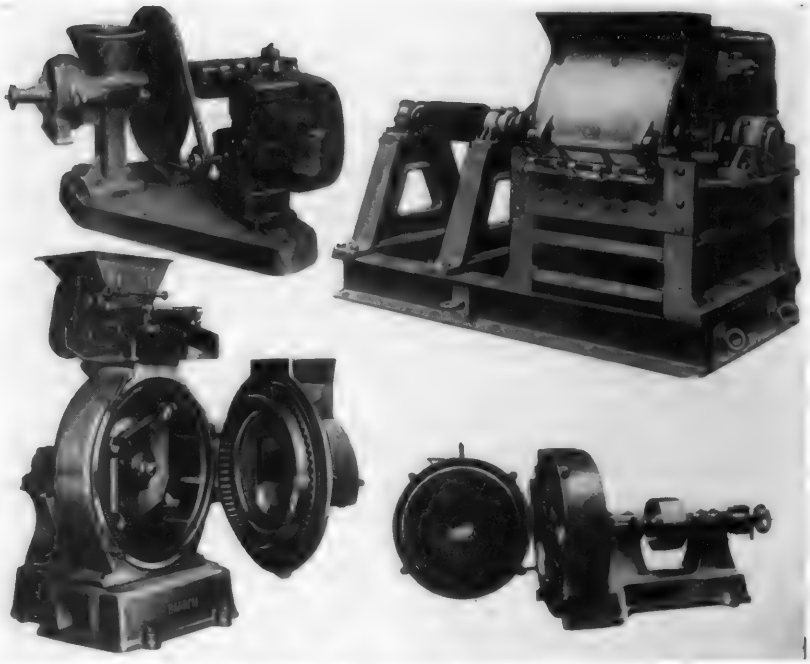
Other grinders made by this firm are the *Dreadnought, Impact, Rotary Pulveriser,* and the *Pep* mill. The first-named is of two types, the "D" type which consists of two vertical grinding stones, one fixed and one rotating, and the "D.P." type, of similar construction but with metal grinding discs instead of stones.

The *Pep* mill is for the smaller user, and can be operated by hand or by a 1 h.p. motor. The makers say it can be dismantled for cleaning in a few minutes without tools. After preliminary breaking in a screw feed, final grinding is accomplished by two $4\frac{3}{4}$ in. self-sharpening, self-centring grinding plates made of chilled iron. Fineness of product is controlled by a screw adjustment with attached locking device.

Wm. Brierley, Collier and Hartley, Ltd.

A new machine this firm have recently produced is for nibbing almonds, hazel nuts, brazils, peanuts, etc. It has special interlocking rollers which can be regulated to suit exact requirements of cut, and has a variable speed to suit different nuts. It will produce, so the makers say, well cut nibs $\frac{1}{8}$ in. square, and other sizes to order, with a minimum of powder.

Other machines made by this company are: a three-roller refiner, fitted with 3 granite rollers all revolving at different speeds and offered in 2 sizes, no. 1 for outputs of 6/8 cwt. in 8 hr., and no. 2 for outputs of 8/10 cwt. in 8 hr.; a two-roll almond mill for



Machines by W. S. Barron and Son. (*Top, left*): **The "Pep" mill.** (*Top, right*): **No. 7 impact grinder.** (*Bottom, left*): **No. 5 impact grinder.** (*Bottom, right*): **"Dreadnought" grinder.**

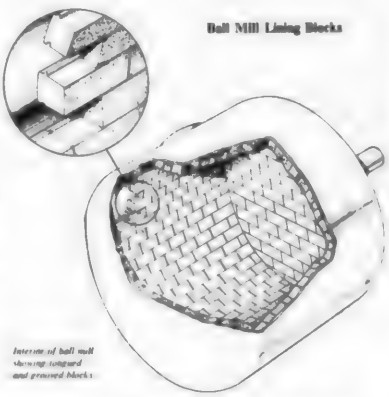
grinding nuts to paste for the production of marzipan, praline, etc., made in two sizes for 6 and 7 cwt. in 8 hr.; a small almond mill similar to the previous two-roll type, with an output of ½ cwt./hr.; and a range of pin disc pulverisers made in 4 sizes suitable for such diverse materials as albumen, almonds, cashew nuts, chocolate crumb, cocoa, coconut, sugar, lactose, orange juice and seal blubber.

The makers claim that two of the biggest advantages are genuine dustless grinding and minimum temperature rise, together with maximum ease of maintenance and cleaning.

Doulton Industrial Porcelains, Ltd.

Pot mills in sizes from 1 pint to 7 gal. capacity and ball mill lining blocks for lining mills from 2 ft. to 7 ft. diameter in *Dosilain* hard porcelain are supplied by this firm. Monolithic shells up to 60 gal. capacity can be fabricated in a modified semi-porcelain. A new range of pot mills, C.401, of unique design has recently been introduced.

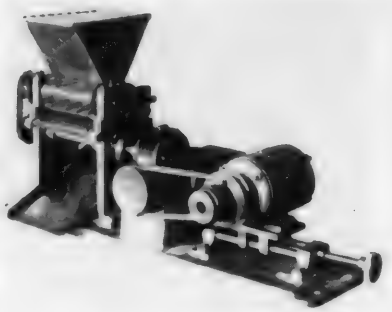
Grinding media such as grinding balls can be supplied from ½ to



Interior of a Doulton ball mill.

3 in. diameter in *Dosilain* hard porcelain and also in a special product made by this firm, *Roydalox*, a porcelain containing some 50% of alumina and which has a higher specific gravity and, so the makers say, even greater wear resistance than the former.

The makers say that industrial porcelain is specially compounded to produce increased mechanical strength, toughness and resistance to temperature change while reducing the brittle nature of this product, and is one of the toughest and hardest wearing materials for grinding.



A new machine by Wm. Brierley, Collier and Hartley for nibbing nuts.

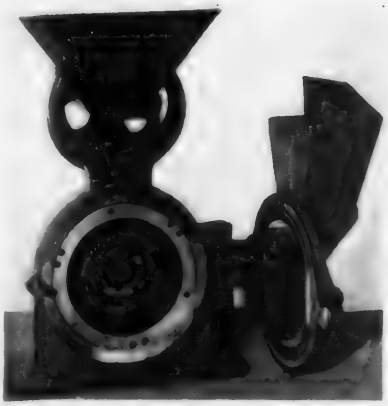
A ball mill made by Doulton Industrial Porcelains, Ltd.

Follsain-Wycliffe Foundries, Ltd.

The *Pulmac* range of pulverisers made by this firm cater for requirements from laboratory sampling to full-scale production. This type of machine is designed for fine grinding a large variety of materials at high speed. An important feature is that it can be adjusted to produce a product ranging from a granulation to an impalpable powder.

The grinding takes place between a wear resisting rotor and stator. The angle and spacing of the rotor and stator lugs play a large part in the material reduction.

The material being pulverised is fed into a hopper placed on top of the pulveriser body and driven by a belt from the rotor shaft. The



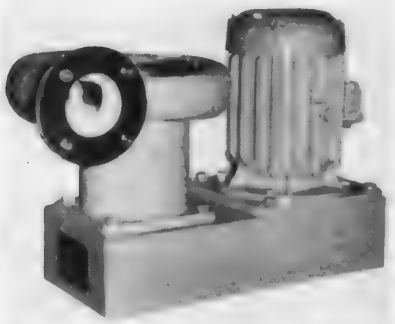
The " Pulmac " high-speed pulveriser made by Follsain-Wycliffe Foundries, Ltd.

feed is via a controllable sliding gate on to an oscillating tray which directs the material into a chute which is integral with the pulveriser door into the centre of the spinning rotor. The material is then projected at high speed, imparted to it by the spinning rotor, against the serrated rings in the stator, so that a combined shearing, beating, crushing and grinding action is carried out. Centrifugal force, assisted by the air induced by the high-speed rotor, draws the material to the periphery of the rotor where it is ejected through the screens. As it is forced from the centre to the periphery, the material is reduced systematically by the grinding action of the rotor and the attrition of the material beating against itself.

The degree of fineness is controlled by the closeness of the rotor and stator and the mesh size of the screens, which vary from 0·1 mm. to 10·0 mm. The screens can be quickly and easily changed.

International Combustion Products, Ltd.

This firm manufacture a range of high-speed pulverisers of the air-swept type, operating in closed circuit with air classifiers, cyclone collectors, etc. The Raymond *Impax* pulverisers no. 3, no. 50 and no. 51 are of the swing hammer type fitted with discs which carry the hammers, a fan for circulating air through the system, and between these components a set of "whizzer" blades whose



The 4B Kek mill fitted with involute delivery ring.

adjustable tip clearances control the fineness of product obtained. A no. 3, running at 1,800 r.p.m. and driven by a 20 h.p. motor when grinding cocoa presscake to a fineness of 90% passing 200 mesh B.S.S., has an output of about 600 lb./hr.

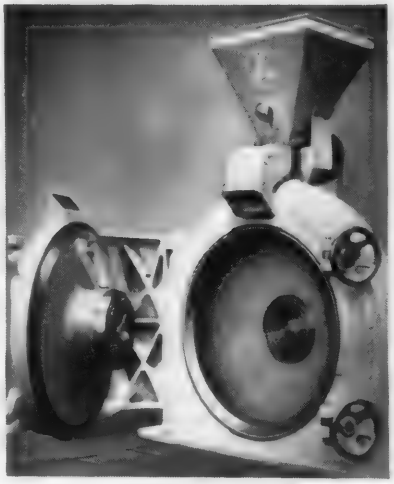
Pulverisers of the Raymond Automatic type have a grinding chamber, the front of which is in the form of a door which can be swung open to facilitate inspection.

The main shaft runs at 2,600 r.p.m. and carries discs to which are attached fixed beaters. These are set at opposed angles in order to create a high degree of turbulence within the grinding chamber and thereby effect the required size reduction.

The fan is sometimes attached to the pulveriser shaft or, when necessary, it is installed as a separate unit; the remainder of the system comprises an air separator and cyclone collector with the necessary interconnecting ducting and bag filter.

No. 00 Raymond Automatic pulverisers, the makers say, are being used on the grinding of lactose from 1 in. lumps to a fineness of about 90% passing 200 mesh B.S.S. at the rate of about 250 lb./hr., the absorbed power being about 12 h.p.

Raymond laboratory mills are designed for bench mounting and are suitable for grinding sample lots either for analytical purposes or for small-scale production. They have a ½ h.p. motor running at 10,500 r.p.m. and the grinding chamber is 6 in. in diameter.



The Alpine " Contraplex " wide chamber mill.

Kek, Ltd.

The current standard machine made by this firm is the pin disc mill made in 4 sizes from 1-1½ h.p. to 30-50 h.p. It consists essentially of two circular metal discs studded with metal pins set in concentric circles, openly spaced near the centre but gradually closing up near the perimeter. The lower disc, with pins pointing upwards, revolves at high speed. The upper disc is stationary, and the pins, which point downwards, fit in the spaces between the circles of pins on the lower disc. The material is fed through a hole in the centre of the upper disc on to the rapidly rotating bottom disc, and is flung by centrifugal force through the rows of pins with their narrowing clearance until it reaches the collecting hopper in the required particle size. The complete absence of screens and grids is claimed to eliminate stoppages due to clogging.

These mills incorporate a toothed belt drive from a vertical flange mounted motor. The no. 4B mill is driven by a 5 h.p. motor, and is capable of producing 6 cwt./hr. of icing sugar, or 1 ton/hr. of pulverised sugar. Other uses, the makers say, include almond grinding, the production of whey powder, of peanut butter from peanuts and the milling of flour to adjust its protein content.

This firm also manufacture kibblers which are used for the granulation of various materials, and a

pin disc mill with air separation for the fine reduction of materials which block conventional pulverisers, such as lactose, sorbitol and vanillin.

Lavino (London), Ltd.

This firm supply the *Contraplex* wide-chamber grinder, which, they say, can be used with nearly all soft to medium-hard materials. It is a pin disc mill in which both discs rotate at relative speeds of up to 690 ft./sec. The speed and direction of rotation of each disc are variable to suit the material being handled.

The *Mikroplex* spiral air classifier, supplied by this firm, is designed to allow material above a certain particle size to be repassed through the mill, and separates a fine mixture into two sharply divided fractions above and below a determined particle size. It is claimed that separations down to 2·5 microns can be obtained.

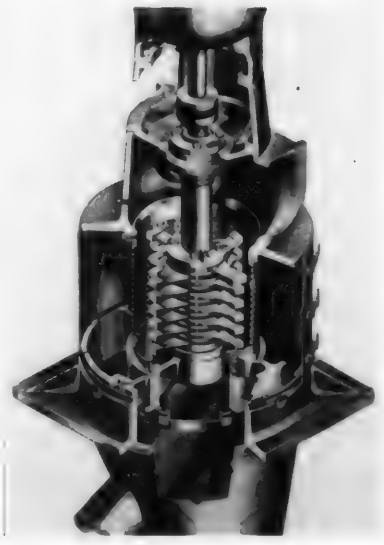
Manesty Machines, Ltd.

A number of comminuting mills have now been added to the range supplied by this firm. The standard *Fitzmill* can be used for processing fresh and frozen fruit, for producing purees for baby foods and soup stocks, for chopping foods, pulverising roller dried milk, gums and other materials, shredding fish fillets, and for sizing toppings and dehydrated foods.

In addition to the standard machines, completely water-jacketed models are available for low-temperature pulverising for such materials as spices, oils, etc.

Another model is a high-speed unit with precision controlled feed and jacketed chamber, bearing housings and feed coat, allowing water, brine or other coolants to be used. This machine can be arranged for liquid CO_2 injection, providing very low processing temperatures for the reduction of extremely heat sensitive products.

All machines are made from stainless steel and operate in a dust-free manner. Various combinations of screens, blades and operating speeds permit wet or dry materials to be processed.



Cut-away view of the Scott-Rietz vertical disintegrator.

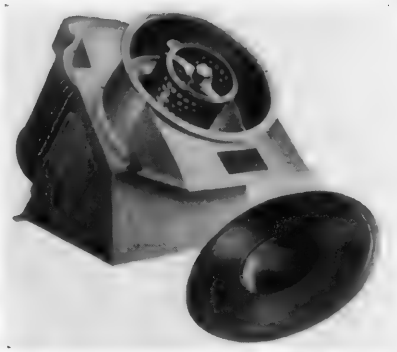
George Scott and Son (London), Ltd.

The Scott-Rietz Vertical Disintegrator is of heavy duty construction throughout and can be supplied in various materials according to requirements. It is used for grinding, pulverising, shredding, pulping, and defiberising. Essentially designed to produce uniform particle size within the small or medium range, it will, say the makers, successfully handle wet or moist materials, and is completely free from vibration.

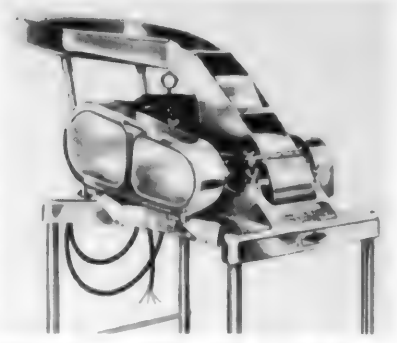
The use of a vertical shaft means that the hammers rotate in a horizontal plane and are surrounded by 360 degrees of perforated screen giving the maximum open screen area. Feed material can be introduced into the machine by either vibratory, screw, or prebreaker feeders. The latter will carry out a preliminary size reduction while simultaneously controlling the feed.

Size reduced material passes through the perforated screen while resistant material, *e.g.* tramp material, etc., passes down through the hammer section and is discharged through the special secondary outlet minimising any damage.

The Scott-Rietz Angle Disintegrator operates on broadly the same principle but is of stainless steel construction throughout. It is used for baby foods, potted meats, fish pastes and fruit and vegetable purees, tomato and fruit juices. The hammers rotate in a plane of 45° to the vertical but the 360° screen and secondary discharge feeders are still retained. The machine is hygienically constructed and is completely and rapidly accessible for cleaning.



The Scott-Rietz disintegrator, designed to give uniform fine grinding with instant homogenisation.



The Manesty Fitzmill model D comminuting machine.

The Scott-Rietz Prebreaker is a heavy duty machine utilising high torque and low speeds. It is designed for heavy crushing, skin shredding, and hogging before disintegration. It gives maximum resistance to shock loads and requires minimum maintenance. Fixed hammers on a rotating shaft pass between fixed anvils fitted to the body. Material caught between the anvils is subjected to the impact and compression from the hammers and is sheared or crushed. Because of the low speeds it is claimed to develop high torque and have a minimum power consumption giving low operating costs. It is used for size reduction of green bone for soup stocks and preliminary size reduction of vege-

A battery of " Entoleter " impact mills made by Henry Simon, Ltd.

table and fish products before cooking.

The Scott-Rietz Extructor is a modification of the Prebreaker and is used for frozen meat blocks, fat trimmings, certain pharmaceuticals, mulling and mixing of cheese, pet foods, and agglomeration of powders with water, etc.

Henry Simon, Ltd.

The type G Rollermill made by this firm is designed for milling wheat flour. All main rolls are centrifugally cast with a deep chill of uniform hardness, to give long life and a first class grinding surface. Reduction rolls are treated to produce a frosted finish which, say the makers, gives excellent grinding results. The machines are equipped with a special feeding mechanism which controls the supply of stock to the main rolls and maintains equal distribution along the entire length of the feed rolls.

After the first break, the resulting mixture of bran and endosperm is sieved, and a recently-introduced plansifter for this purpose is the *Seniorsifter* which, in a comparatively small space, provides a large and effective sieving area with a wide range of separations. Apart from the wooden sieve frames, it is an all-metal machine which is easy to clean and maintain. Two sizes are supplied, the smaller containing a total effective sieving area of up to 270 sq. ft. and the larger up to 405 sq. ft.

The type S Purifier is the latest in a long line of purifiers. Its purpose is to separate by air classification the bran, semolina and flour which results from milling wheat grain. It is, say the makers, a compact machine which enables the flow of stock to be conveniently seen and allows easier cleaning; it can be mounted two-high where floor space is limited or where extensive re-purification is necessary, as in semolina milling. The machine is constructed entirely of aluminium alloy pressings and extrusions, combining strength, rigidity and lightness.

Grinding and pulverising through impact is the function of *Entoleter* impact mills, which, say the makers, are processing hundreds of tons of material daily in the food industry. Their main purpose is to provide an accurate particle size at high outputs. Material to be ground is fed on to a revolving rotor which throws it outwards by centrifugal force until it strikes and disintegrates against impact pins. Particle size can be controlled by carefully selecting the correct rotor speed.

Near the Ultimate in Automation—II

(*Concluded from page 9*)

Sapal BN/p wrapping machines for individual wrapping at up to 140 per min.

All products are packed in automatically glued fibre cases and conveyed down to an air-controlled basement warehouse where they are subjected to a further period of conditioning before despatch.

Main services are housed in a 3-storey extension outside the factory so as not to detract from the suitability of the single storey factory for even longer production lines in the future.

* * *

Such, then, is Macdonalds, a firm which has ridden on the crest of the wave since in 1945 it made its bold bid to break through to the national market and succeeded. With their progressive policy and their tradition of never standing still, they are well-equipped to meet increasing competition, and their capital outlay on the most modern equipment is a token of their confidence in the future and their determination to remain in the forefront.

Some Suppliers of Equipment

Baker Perkins, Ltd.: flour and sugar bulk handling plant, mixers, dough handling and baking plant, wafer ovens, control panels.
Wm. Douglas and Sons, Ltd.: fat and liquid handling plant.
Bramigk and Co., Ltd.: sugar mills, depositors, enrobers.
Fielden Electronics, Ltd.: indicators and controllers.
Forgrove Machinery Co., Ltd.: wrapping machines.
Kelvin and Hughes (Industrial), Ltd.: indicators and controllers.
Packaging Machinery (Peters), Ltd.: wrapping machines.
S. Parsons and Co., Ltd.: indicators and controllers.
Rownsons (Conveyors), Ltd.: conveyors.

That nearly every factory contains combustible material of some kind and some possible cause of fire is the theme of a booklet entitled *Nothing to Burn?*, published recently by the Fire Protection Association. Some causes of fires and materials that have helped to spread the fires are listed.

Zacatepec in Mexico, which is claimed to be the world's largest sugar co-operative.

Sugar Production in Mexico

Zacatepec is claimed to be world's biggest sugar co-operative

WHAT is claimed to be the world's largest sugar co-operative is to be found at Zacatepec in the State of Morelos in Mexico. At the present time, grinding capacity is about 700,000 tons per year, and as soon as more cane becomes available, the management plans to step up production to 1 million tons.

This production is achieved with a 5-mill plant, each mill measuring 78 in. by 35½ in. The general superintendent, Ingeniero Guillermo Uribe, believes this could well be the record for a tandem of this size.

Besides the sugar production, 1,700,000 litres of alcohol are produced, 1 m. standard grade and the rest high quality.

The sugar industry in Mexico dates from 1520, when Cortes installed a piloncillo plant in the neighbourhood of Cuernava, Morelos. At the time of the revolution in 1910 there were some 28 large sugar *haciendas* in the state, many owned by wealthy families.

The first sugar in the Western Hemisphere was made in Mexico. The flourishing industry destroyed by the 1910 revolution is now recovering, and large centrals such as the one this article describes are now in production with modern machinery.

All these were pillaged and destroyed during the revolution, and the livelihoods of both workers and owners disappeared.

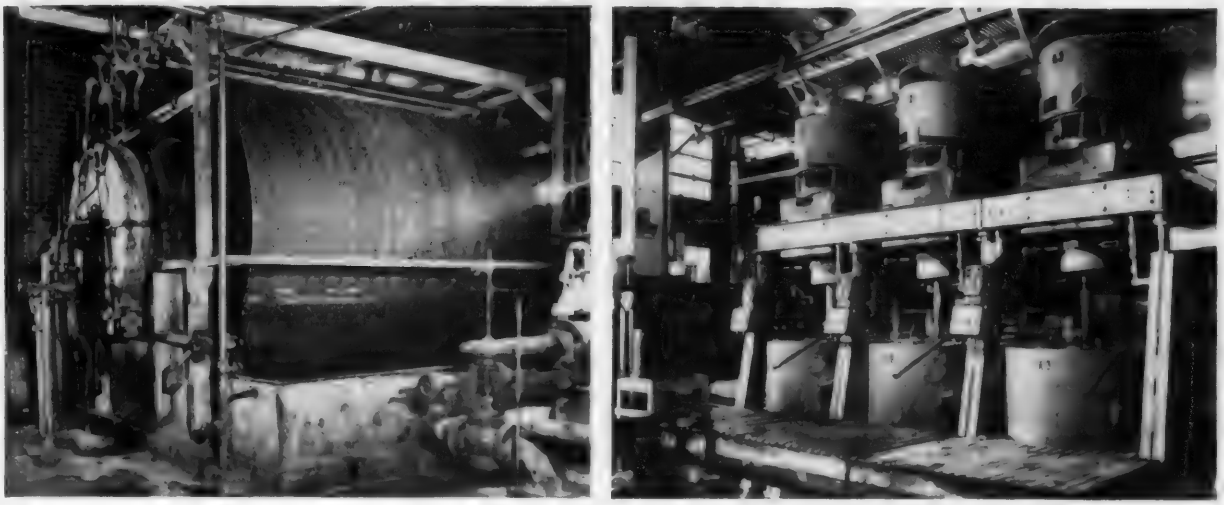
Not until the 1930's did Morelos begin to recover some of its former fame as a sugar producer. In March, 1937, Zacatepec was inaugurated, at the time the world's most modern sugar central, officially known as Ingenio Emiliano Zapata.

For some years, Zacatepec was famed as the world's most modern ingenio, chiefly because war and its high demand for machinery stopped the manufacture of sugar processing equipment.

Now the central still operates with all the original equipment, but as production increased, new machinery units were added. With the addition of two AEG 400 h.p. motors to power the fourth and fifth mills, grinding speed and production have been stepped up. The first three mills still retain their original 300 h.p. G.E. motors, but as need comes they will be supplanted by more powerful units. Ingeniero Uribe believes it more economical to increase production of the present Fulton tandem than to buy additional cane grinding units.

The six original U.S. Pipe and Foundry Co. evaporators have been augmented with an Allen from the U.S.A. and three locally

Trucks like this one transport the sugar to Mexico City.

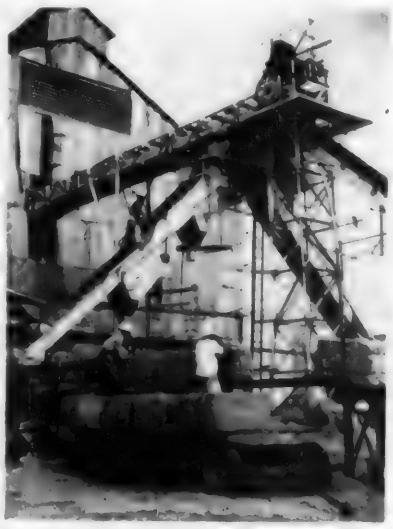


(*Left*): **A rotary filter.** (*Right*): **sugar centrifugals.**

constructed units. Evaporators and pans were equipped with multijet barometric condensers by Schutte and Koerting. They are serviced by five Ingersoll-Rand auxiliary pumps.

Additional evaporating surface was added to eliminate time lost in cleaning operations. Now Zacatepec works around the clock and around the week with no stops. When the grinding tonnage increases, juice will be decalcified thus eliminating the need for more evaporation surface. Experiments are now being made to that end.

There are eight pans; six dating from 1937 are from the U.S. Pipe and Foundry Co. Later a Goslin Birmingham was installed as well as a pan built in the local shop.



Loading bagasse, a by-product which is sold to a cellulose factory.

Of the fifteen crystallisers, eight are Turl, seven are made in Mexico. The Oliver filters date from the plant's inauguration. Two Eimcos were added later on.

Six of the original dozen centrifugals are Roberts; the other six are Hepworths. Later twenty more Hepworths were installed, and now five of the new twin-wheel hydraulic type Hepworths have recently been installed.

The first five boilers were Babcock and Wilcox, and later a Combustion Engineering unit was added. All were conditioned for bagasse burning. However, a market was found for the bagasse and they now burn oil. The bagasse is conveyed from the mill by steel constructed Jeffery equipment. There it is compacted into bundles and sent to a cellulose mill in Mexico. The saleable value is about one and a half million pesos a year.

The cane is produced from 15,000 ha., or 37,000 acres, divided between 56 ejidos or agricultural societies, all members of the co-operative. Apart from this a few independent ranches covering about 3,370 ha. sell to the co-operative.

Probably there is no central in all the world which offers the extent of social service of Zacatepec. The medical department, for instance, cares for 37,000 people; this includes members of the co-operative and their families as well as the cane cutters. There is no cost.

Twenty years ago Zacatepec was an ugly bare village of huddled thatched huts. Now it is a garden city with charming tiled-roofed tree-shaded homes.—MARY SAINT ALBANS.

Food Directory, 1959-1960

THE structure of the fourth edition of this very useful reference book* remains as before. The main sections are Food Manufacturers, Commodities, Plant and Equipment, Packaging Materials, Brand Names and Food Laws.

The first four are divided into two parts, one giving the names, addresses and telephone numbers, and the second a classified list of the materials or products.

The recent alterations made in various countries in the permitted lists of colouring matters are shown in the Table of Official Permitted Colours.

Other sections of the directory give information about Government departments, food research organisations, trade associations, schools and colleges with full-time specialised courses in food technology and a list of consultants.

* *Food Directory* 1959-1960. Edited by R. De Giacomi, F.R.I.C. Tothill Press, Ltd., London. 1959. Pp. 845. 40s. net.

Advances in Food Technology

AEROSOLS

Product Sterilisation

The object of this study was to determine if any commonly used food propellents would inhibit growth of food spoilage organisms. If so, then it might be possible to use less severe processes to render "commercially sterile" foods pressurised with that gas.

Nitrogen was not found to inhibit the growth of any of the test organisms. However, when the oxygen content of headspace gases was reduced before the containers of media were pressurised, growth of *A. niger* was inhibited. *A. niger* was the only organism tested that did not grow in medium gassed with nitrous oxide. When a vacuum was drawn on the cans of media before pressurising with nitrous oxide, none of the mould cultures grew. Growth of fungi was more effectively inhibited by carbon dioxide than was the growth of the bacterial cultures tested. The only fungus to grow in medium charged with CO_2 was yeast from beer but this organism did not grow in samples vacuumised before gassing.

The oxygen content of samples pressurised with carbon dioxide had no effect upon the growth of the bacteria tested. Carbon dioxide not only inhibited the growth of *A. ærogenes*, *Cl. botulinum*, P.A. No. 3679, *Cl. butyricum*, and *S. aureus*, but also reduced the number of viable cells or spores. A similar reduction in viable yeast cells was also observed.

Using mixtures of nitrous oxide and carbon dioxide, it was observed that the inhibiting concentration of carbon dioxide varies with different organisms. Since none of the commonly used propellents inhibited all test organisms, it was concluded that the thermal treatment necessary to render unrefrigerated pressurised foods "commercially sterile" would be essentially the same as for comparable foods canned in the conventional manner.—G. L. Hays, J. D. Burroughs and R. C. Warner, *Food Technol.*, 1959, **13** (10), 567.

ANALYSIS

Amino Acid Determination

A collaborative assay of a mixture of amino acids by Moore and Stein's resin-chromatographic technique carried out in 10 laboratories. The object was to assess the accuracy of the method as operated in different laboratories.

The results showed a high degree of consistency and agreement between the laboratories. Nine amino acids, glycine, phenylalanine, lysine, valine, serine, threonine, aspartic acid, glutamic acid and tyrosine, were determined with a mean recovery of 100 $\pm 2\%$; the remaining 7, alanine, leucine, isoleucine, arginine, histidine, proline and methionine, were determined with an error of $\pm 8\%$. The cystine in the mixture deteriorated. A second test showed that the determination of this amino acid is still not satisfactory, but that a correction factor can be applied with good results.

The experience of the collaborating laboratories emphasised that the accuracy of the procedure depends upon close attention to the many points of detail, and that considerable improvements in recovery of amino acids followed improvement in procedure.—A. E. Bender, J. A. Palgrave and B. H. Doell, *Analyst*, 1959, **84** (1002), 526.

Fat Antioxidants

Tabulated results of the application of 7 tests for the presence of 20 antioxidants in edible fat show the necessity for the application of at least three of the tests. These were the reactions with molybdophosphoric acid, ferric thiocyanate and ferric ferricyanide.

Positive results were obtained with autoxidised oils, with a peroxide value of not more than 10, in the absence of any antioxidant; negative results were, however, obtained in the absence of any peroxides. Autoxidation products showing peroxide values of not more than 6 can similarly interfere with the determination of antioxidants by titration with ceric sulphate. It was found that when applying the Amer. Oil Chem. Soc. stability test to arachis oil the time of heating at 105°F. should be prolonged to 8 hr.

Spectrophotometric data are given for 10 antioxidants. For the isolation of antioxidants for spectrophotometric analysis, it is recommended to extract a solution of the sample (20 g.) in hexane (40 ml.) with 75% methanol (2 × 30 ml.), all operations being carried out in a current of inert gas.—A. Seher, *Fette, Seif., Anstrichtmitt.*, 1959, **60** (12), 1144.

ANTIOXIDANTS

Synergistic Effects

Studies have been carried out to find the most suitable concentration of alpha tocopherol, the optimum amount of amino acids which should be used as synergists with respect to the use of alpha tocopherols and the effect of 16 alpha amino acids on the antioxidising properties of alpha tocopherol.

The activity of specific amino acids of a homologous structure was found to increase with the length of the chain and their antioxidising properties were also affected by the presence of a hydroxyl group. The best synergistic substances were found to be serine, isoleucine, alanine, kycine hydrochloride, tyrosine, phenylalanine, arganinine hydrochloride, asparagine, glycine and glutamic acid. Cystine, valine, asparaginic acid, proline, and tryptophane promoted oxidation.

It was emphasised that the results were only of a practical and compara-

Technical Press Review

January

Dairy Engineering.—Cold Store Design; The Bacteriology of Milk Refrigeration; Refrigeration Plant and Equipment; Europe Sees the Latest Dairy Equipment; Milk Powder Production in Yugoslavia; Centrifugal Separators.

Manufacturing Chemist. — Air Conditioning: Special Feature; The Use of Agar Films as Ultrafilters; The Polyols—1; Gelatine and Glue Liquefiers in Industry and Research; Progress Reports: Perfumery and Essential Oils; Pest Control Chemicals; Analytical Chemistry.

World Crops.—Smithfield Show Review; The Pattern of Seed Dressing Development; Use of Hybrid Seed Corn in the Tropics and Subtropics; Silage Maize in Northern Europe; Cultivation of Wheat on Ridges; State of World Agriculture.

Paint Manufacture.—High Boiling Solvents for Nitrocellulose Lacquers; Functions of Paint Solvents; Silicones Improve Wax Polishes—3; Advanced Paint Chemistry—5.

Petroleum. — Safety and Fire Equipment Review; Shell Haven Chemical Fertiliser Plant; Japan's Refining Industry; Petrochemicals at Grangemouth; U.S. Tests with Multigrade Oils; Lube Oil Plant at Casper, Wyoming.

For specimen copies write to Leonard Hill House, Eden Street, London, N.W.2.

tive character owing to metallic impurities and trace contamination of proteins and amino acids in lard as well as to the difficulties in evenly distributing the amino acids, which are poorly soluble in fat.—J. Janicki and M. Gogolewski, *Przemysl Spozywczy*, 1958 (10), 417.

DEHYDRATION

Potato Products

Investigations were undertaken to establish standard conditions of sample preparation for a more reliable evaluation of cell rupturing in dehydrated potato products. An improved rapid method was developed and found to provide good replication for microscopic counts of ruptured cells.

Dehydrated samples are diluted directly with hot water (130°-140°F.), and reconstituted or cooked potatoes are diluted with either hot or cold water. An aliquot of the suspension is placed in a counting chamber slide of 1 ml. capacity and a coverglass added. Rupturing as a result of sample preparation is avoided and staining with iodine is unnecessary. Replicate counts of 1,000 or more cells each at 40× magnification showed close agreement. Close agreement between cell rupturing and stickiness in reconstituted products was also obtained. Stickiness increased as cell rupturing increased and was pronounced in samples with 10% or more of the cells ruptured.

The method may also be used to determine distributions of separated cells and clusters of unseparated cells in products representing different stages of manufacture.—R. M. Reeve and G. K. Notter, *Food Technol.*, 1959, **13** (10), 574.

FLAVOURS

Pesticide Effects

Two years' flavour evaluation tests with frozen strawberries from plants sprayed with each of 21 insecticides and five fungicides have been described. Included are methods of growing and processing the fruits, and methods and results of taste tests conducted in 1957 and 1958. In addition to flavour evaluations on the frozen fruit, the experiment included studies of the biology of mites and insects attacking strawberries and the effectiveness of acaricides and insecticides in controlling these pests.

Chemical residue analyses on the frozen strawberries were made by a U.S.D.A. research laboratory. Because fungus diseases and rots may also injure strawberries during wet years particularly, a fungicide, captan, was added to all spray materials except aramite. Captan and four other fungicides were studied separately in 1958. Under the conditions of this experiment, none of the pesticides tested imparted detectable off-flavours to frozen strawberries, even to fruit harvested one day after spraying.

In 1957, a significant number of judges were able to distinguish differences between samples treated with tedion, parathion, thimet, malathion and guthion; but these differences were not considered to be off-flavours. In two instances where differences were observed, strawberries from plots sprayed with malathion and with guthion, harvested one day after spraying, were judged to be significantly better than the controls. Apparently these pesticidal treatments had some slight temporary flavour effect which the judges found desirable.

In 1958 tests, significant differences between treated and untreated strawberry samples were observed in those treated with TDE and with mitox. Again, the differences were apparently not off-flavours because the treated samples received flavour rating scores which were about the same as those of their controls. None of the five fungicide-treated samples tested was judged to be significantly different from the controls.—D. A. Tichenor, J. G. Rodriguez and C. E. Chaplin, *Food Technol.*, 1959, **13** (10), 587.

DAIRY PRODUCTS

Milk Fat Triglycerides

A mixture of pentane, 2-nitro pentane and nitromethane in the proportions of 12:7:5 was found to be the most satisfactory solvent system for the countercurrent separation of milk-fat triglycerides. The degree of unsaturation and the molecular weight of the triglycerides affected the separation.

Although useful separations were obtained in 100 stages, better separations were achieved when the milk fat was previously fractionated by low temperature crystallisation from pentane. A small amount of palmitin was present in the plus 4° precipitation in addition to dipalmitostearin and dipalmitomyristin. In the −53° filtrate, monoethenoid acids were associated with high molecular weight saturated acids, whereas polyethenoid acids were associated with low molecular weight saturated acids.—W. Haab, L. M. Smith and E. L. Jack, *J. Dairy Sci.*, 1959, **42**, 457.

PACKAGING

Freezing Effects

The effects of storage of bread and sponge cake with regard to palatability, crumb formation, compressimeter measurements and weight loss at temperatures of 8° and −12°F. in various packagings for periods of 4, 6 and 10 months are tabulated.

All the bread was packaged in commercial wrappings and some was overwrapped with other materials. The sponge cake was packaged in bakery cartons and also wrapped in polythene-coated *Cellophane*. The commercial bread wrappings and the bakery cartons showed pronounced differences in regard to taste, compressimeter readings, and weight losses.—J. D. Winter and S. R. Trantella, *Package Engng.*, 1958, **3** (8), 32.

VANILLIN

Ultrasonic Extraction

The amounts of vanillin, and of oleoresins, extracted from homogenised vanillin pods by ethanol are increased by exposure of the mixture to ultrasonic vibrations and maximum extraction is obtained in a shorter time. The extent of extraction is increased with the intensity of the treatment and it was greater with an intermediate frequency than with those higher or lower. It was also proved to be greater with vanilla of 16% moisture content than with that of 12·8% content.—G. Obolensky, *Industr. Aliment. Agric.*, 1959, **76**, 420.

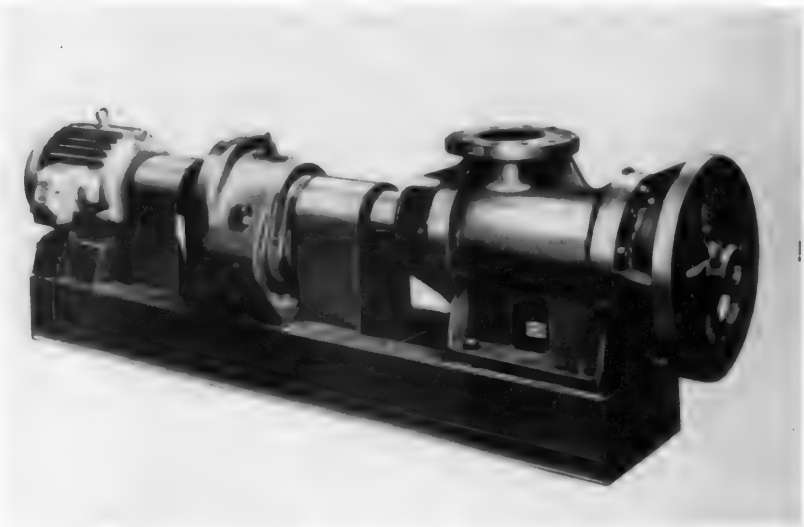
How Russians solve Fat Storage Problems

(*Concluded from page 23*)

with two corridors for (*a*) production and (*b*) sales, as shown in Fig. 2. The cold-store section, on the side of the corridor for sales, has a railway branch line for loading goods into trucks—or other transport means as shown. If, on the other hand, the two stores are some distance apart they may be connected by tunnels or galleries. Operating methods are described.

Another little problem, tackled this time by the Zaporozhsk Fats Trust, related to the briquetting and packing of cooking margarine into 100 and 200 g. packs. In 1958 a mayonnaise measuring and packing semi-automatic machine was tried under specified temperature and other conditions. In one month about 10 tons of vegetable fat, as well as table margarine, was packed with this machine. Later on cooking margarine was similarly treated, as also combine fat (*Kombizhir*). From May to the end of 1958 64·8 tons of vegetable fat and 55·4 tons of combine fat were measured and packed for the local population. During the first quarter of 1959, 102 tons of cooking margarines were packed in this way.

Machinery and Equipment



A new IMO pump for handling viscous fluids, made by Mirrlees (Engineers), Ltd.

PUMP

Mirrlees (Engineers), Ltd., have now added a new type to their range of *IMO* pumps for handling viscous fluids.

Employing the *IMO* screw thread form, this range is stated to have the special feature of providing very large inlet ports. These are on the common axis to the screws and are said to ensure the easy flow of very viscous fluids. According to the makers, there are no cavities inside the pump to trap and hold fluid.

It is claimed that high suction lifts can be achieved and there is no pulsation or emulsification of the fluid.

The new Fielden Bikini precision temperature controller.

TEMPERATURE CONTROLLER

The first of the new *Bikini* range of transistorised instruments made by Fielden Electronics, Ltd., has just been released. This is a precision temperature controller said to have a differential of only 0·5°C., high calibration accuracy and high long-term stability.

The instrument is housed in a small meter type case and occupies a panel space of 4½ in. diameter. The scale, which is 9 in. long, is calibrated directly in °C. or °F., and the bold pointer is set to the required control temperature by a small knob in the centre of the instrument. A red lamp visible from the sides as well as from the front indicates the control action. The meter type case is completely sealed and contains no galvos, pivots or other delicate moving parts, and the instrument can be mounted at any angle—for example, on a sloping control desk. Control can be at any temperature between −200°C. and +500°C. with a minimum temperature range span of 50°C. and there are 12 standard calibrations in °C. and °F.

BAKING EQUIPMENT

Two new items of equipment, a double-deck pastry oven and a scone plate, have been introduced by the General Electric Co., Ltd. The first item is a scone plate with a 4 kW. loading which provides an even temperature over the heated area of 24 in. × 18 in. Accurate heat control is provided by means of a 3 heat rotary switch with pilot light.

The heated area is constructed of cast iron and the body of mild steel. The sides and front are finished in mottled grey vitreous enamel and the rear in rust resisting dull nickel plate.

The other item is a baking oven designed on the unit principle so that an additional deck can be added to a single oven model as trade increases. Six standard 30 in. × 18 in. baking trays can be accommodated in each deck, which has a sole area of 63 in. × 57 in. The decks are equipped with an easily operated side hinged door.

Six top and six bottom elements are enclosed in steam-tight steel tubes, making a loading of 15 kW. for each deck. They operate at black heat and are controlled by four 3 heat rotary switches (with pilot lights) to allow flexibility in the control of the oven heat. Only 1½ hr. is needed to attain a temperature of 500°F. A colour coded temperature indicator enables the oven heat to be checked at a glance.

The front panel of the oven is constructed of stainless steel, the door and legs are of cast iron with mottled grey vitreous enamel finish, and the outer case is of sheet steel finished grey stoved enamel.

PAPER SACK SYSTEM

What is thought to be the first comprehensive system of paper sacks and holders for the disposal of refuse is being introduced by Medway Paper Sacks, Ltd., in conjunction with Cartem Engineering, Ltd.

The use of paper sacks is thought to be more hygienic than traditional methods because, in all applications, the entire container is disposed of after use together with its contents.

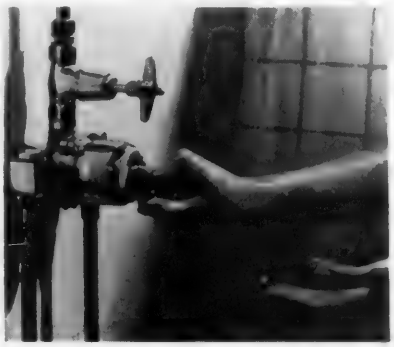
Four standard sizes of Medway sacks are in use: 25 in. × 11 in. × 5 in.; 39 × 14 × 8; 39 × 16 × 13; and 44 × 20 × 12. They are constructed from 37 lb. d.c. wet strength kraft with barrier plys for special applications, and are coded by using colours—orange, blue, grey, green and natural kraft. To sub-classify the contents of a container within a particular use the crepe tapes used in the sewing of the bottom of the sacks also can be supplied in various colours.

The holders are supplied in a stove enamel finish, and include pedestal, wall mounted and wheeled versions. The majority are fitted with lids, unnecessary for some industrial uses, which can be foot or manually operated.

The paper sacks used in the system are made by Medway Paper Sacks, Ltd., and the holders are made by Cartem Engineering, Ltd.

The Medway system of colour-coded disposable paper sacks designed to simplify the hygienic collection of waste and refuse. The sacks are thrown away with their contents.

The new dual purpose bulk grain or flour carrying vehicle built by Bonallack and Sons, Ltd., for Spillers, Ltd., is easily and quickly converted from one role to another by the addition or removal of the light alloy blown discharge chamber.



The new Leonard 21 thermostatic mixing valve with top outlet for shower, made by Walker, Crosweller and Co., Ltd.

MIXING VALVE

The *Leonard 21* is the latest addition to the Leonard thermostatic hot and cold water mixing valves made by Walker, Crosweller and Co., Ltd.

The new valve has a regulating handle and indicating scale plate for quick temperature selection. Longer travel of the handle and a modified thermostat element are said to ensure a wider temperature range and greater ease of selection.

The hot and cold water supplies enter the mixing pillar through ports, the opening of which is controlled by a ported sleeve rotating outside the pillar. The sleeve is connected to a bimetallic thermostat situated over the outlet of the mixing pillar. This receives and reacts to changes in the mixed water temperature almost instantaneously. Under normal conditions the mixed water temperature is maintained within $\pm 2°F$.

The thermostat assembly is self-contained and fits into the body as a cartridge fits into a gun. After undoing the four cover screws and removing the cover, the thermostat assembly can be pushed out and put back again or replaced without the use of any tool whatsoever.

BULK CARRIER

A dual purpose vehicle capable of carrying either a nine ton load of grain or about 6½ tons of flour, with the ability to discharge the latter to overhead storage, has recently been put into service by Spillers, Ltd.

Specially built to Spillers' requirements by Bonallack and Sons, Ltd., the new vehicle consists basically of a bulk grain tipping body of light aluminium alloy, measuring 15 ft. × 7 ft. 6 in. × 7 ft. high internally, inside of which may be mounted a detachable blown discharge container of 462 cu. ft. capacity.

The bulk grain body, equipped with *EDBRO* 4 LN tipping gear and mounted on an Albion Riever RE 27 12 ft. 2 in. wheelbase chassis, can discharge either by gravity through two apertures in the floor of the vehicle, or by conventional end tipping. Special traps operated by a rack and pinion mechanism controlled from the nearside of the vehicle, open and seal the floor discharge outlets. Half doors are provided at the rear end of the body with small folding flaps to give access to the blowing equipment when the container is being carried. Lashing hooks for the canvas cover are recessed into the sides of the body.

The blown discharge container, also of light aluminium alloy, is mounted inside the tipping body by means of 2 elongated pyramidal feet, recessing into the discharge apertures in the floor of the body and secured by four bottle-screw attachments. It discharges flour by the Bonallack tip and blow method, utilising a Wellworthy-Ricardo blower delivering 300 cu. ft. of free air per min. at 10 lb. per sq. in. Hose sections for blown discharge are carried in tubes running beneath the interior panelling of the body.

The blower controls, including a hand throttle and blower speed tachometer, are grouped externally at the rear of the drivers' cabin, together with the tipping gear control.

The gross unladen weight of the vehicle including the container, is 6 ton 19 cwt., of which the tipping body accounts for 1 ton and 2 qu. and the container 9 cwt.

In pre-delivery trials the vehicle discharged about 6½ tons of flour over a distance of 40 ft. vertically and a further 40 ft. horizontally in 22 min.—a rate equivalent to 19 ton per hr., with a delivery pressure of 9 p.s.i.

SACK TRUCK

F. Piper and Sons, Ltd., are producing a folding metal sack truck weighing approximately 12 lb. In its open position it is 3 ft. 2 in. high by 1 ft. 3 in. wide and is made from ¾ in. diameter tube and fitted with 4 in. diameter solid rubber-tyred wheels on plain bearings with a ½ in. solid steel bar axle.

The tubular shoe extension is 6 in. and its carrying capacity is 1½ cwt. Finish is in light green paint.

The truck folds in half and it carries like a brief case.

This Piper folding sack truck, shown open, weighs 12 lb. and folds to a compact size.

ELECTRONIC REGISTRATION

Electronic Machine Co., Ltd., have just introduced an electronic registration device known as the R.E.1, and it consists of a scanning head, a reflector-type photocell and light head and a power supply and amplifier unit.

The principle upon which the equipment works is that light is projected through a small opening in the scanning head on to the packaging material which has to be registered. The light is then reflected back again into the scanning head and picked up by a pair of photocells. Changes in the density of light being reflected back into the photocells depends on the colour of the material. These changes in density set up different voltages in the photocells which when amplified can be easily discernable one from another.

When the registration mark on the material passes through the light beam the resultant change in voltage is passed to the amplifier. On receipt of this signal from the amplifier the relay will then perform any special control function to which it may be put.

A further example of the use to which this equipment can be put is the sorting of cartons containing different types of product but travelling on a common conveyor. By printing a different registration mark on each of the types, the cartons can be made to stop or divert from the conveyor at their individual predetermined stations.

AIR HEATERS

Colt Ventilation, Ltd., have introduced a new range of industrial oil-fired air heaters which are to be called *Turbo-Static* and are being manufactured initially in three sizes rated at 250,000, 350,000 and 500,000 B.T.U's.

The new combustion unit embodies what is described as a fundamentally new system of combustion air supply. Theoretically a minimum of 14 lb. of air is required for the complete combustion of 1 lb. of gas oil. In the conventional oil-fired air heater the mixture is stated to be 20 to 50 lb. of air to 1 lb. of gas oil. In the new unit the mixture is 16 lb. of air to 1 lb. of gas oil. The difference between the two forms of heater lies in the control of the combustion air supply.

In the Colt combustion unit a pressure blower forces air into the combustion chamber through a series of vaned slots in the inner chamber wall. The vanes impart a swirl to the air and two contra-rotating air streams are created. The interaction between the air streams creates air turbulence, said to ensure the complete and rapid mixing of the oil mist and the air. As a result excess air requirements are reduced to a minimum. Then the vortices "hold" the flame, so that complete combustion is achieved in a limited space less than 15 in. long. The outer air stream forms a barrier layer which prevents the flame from impinging on the chamber walls.

The Colt Turbo-Static industrial air heater.

The combustion chamber is isolated and insulated from the main air supply by two outer walls, through which the combustion air flows. In this way conduction heat loss from the chamber to the main air supply is infinitesimal and the combustion air is pre-heated to temperatures above the evaporation temperature of the oil mist. Consequently, the firm claims, instantaneous combustion occurs throughout the flame.

The pre-heating of the combustion air and the reduction in excess air makes it possible for temperature in excess of 3,000°F. to be achieved throughout the chamber as against an average temperature of 1,600°F. in the conventional chamber. At this temperature every particle of oil mist is evaporated so that sooting, the incomplete combustion of the fuel, is eliminated.

Approximately 5% of the combustion air enters the chamber unheated, through angled slots around the fuel injection components, thereby cooling the injection components continuously.

The combustion gases are then forced out of the pressurised chamber into the heat exchanger. They flow through the exchanger in contra-flow to the main air supply so that maximum heat exchange is achieved within a short distance.

MIXER

The *Strahmann* mixer, recently introduced by Henry Simon, Ltd., is a machine for the continuous production of homogeneous doughs. Flour is introduced from a conventional feeder, liquids are pumped in through appropriately placed inlet pipes, and the mixing action is carried out by a series of impellers and shear discs which ultimately force the dough out through a nozzle in a continuous length of uniform diameter and consistency.

It is claimed that, using this mixer, bulk fermentation may be greatly reduced or even eliminated entirely, the dough being fed direct into the dividers. It is claimed that more water may be added without adverse effect, and finished loaves are excellent.

The Strahmann mixer nozzle, supplied by Henry Simon, Ltd., for the continuous production of homogeneous doughs, shown discharging into a divider hopper.

Packaging

(*Left*): **Four cereal packs in new styling by Metal Box Co., Ltd., with a different colour for each food.** (*Right*): **A tartan wrapper for oat bread, printed in three colours and treated with Lustrawax, by the Robinson Waxed Paper Co., Ltd.**

Disposable plastic plates

Disposable plastic plates for the catering trade and the picnicking housewife are now being manufactured by Mono Containers, Ltd.

These plates are moulded in two sizes, 6 in. and 8 in., with *Styron 440* polystyrene, a new high impact material claimed to have excellent heat resistance. They are made by a special vacuum-forming process which is said to ensure a continuous output and unvarying quality.

As the plates are made with polystyrene, they are claimed to impart no taste to food, to be hygienic and virtually weightless.

New thin-walled plastic plates for the catering trade as well as the housewife are now being made by Mono Containers, Ltd., from British Resin Products' Styron 440.

Brand styling

The design studios of the Metal Box Co., Ltd., have designed a brand image for goods sold by the SPAR organisation. That the design had to suggest quality, be easily recognised in colour or in black and white, and be effective as a repeat pattern when displayed in bulk was, of course, all a part of the assignment.

It is believed that this is the first time that such a project has been undertaken on so wide a scale without starting from any existing containers or designs, save that of the client's only fixed requirement that the SPAR symbol, a fir tree imposed on a red circle, should be included.

A check pattern of white and coloured triangles was adapted to the shape of the various packages for different goods. The SPAR symbol was also used, but it does not dominate the design. Garamond italic was chosen for the main lettering, because it was considered to be both distinguished and legible.

SPAR is an association of independent grocers and wholesalers set up in this country in 1956. SPAR (Britain), Ltd., consists of 27 wholesalers, giving quantity terms to the SPAR grocers, nearly 2,000 of whom are organised in the Guild of SPAR Grocers, Ltd.

Oat bread wrapping

A speciality oat bread now on sale in Britain is new to many palates south of the Border, at least. Containing one-minute Quaker Oats, it is proving popular after its introduction by a number of regional bakeries.

Described as being made from an old Scottish recipe, and with stress on its keeping and toasting qualities, the new Quaker oat bread appears in a gay but traditional tartan-edged wrapper, printed by the Robinson Waxed Paper Co., Ltd.

The body of the wrapper, which is printed in 3 colours, uses the design already familiar from Quaker oats packets, with the tartan addition. It is treated with *RWP Lustrawax*, for high gloss.

Plastic pouches for bacon

Bowyers (Wiltshire Bacon), Ltd., are now packing their smoked bacon (streaky and best back) in pouches made of *Metathene* grade D320, made by the Metal Box Co., Ltd., to meet the demands of self-service retailing, and the consumer who is becoming increasingly hygiene and brand conscious. Bowyers are also able to sell their bacon, which is distinctively cured, to places as far afield as Ghana, the Bahamas, and several Mediterranean ports.

The pouches, sealed on the Metal Box vacuum drawing and pocket sealing machine, are said to give flavour and colour retention and a shelf life under refrigeration of eight days.

News Digest

Food Standards Committee Report on Preservatives in Food

Proposals for amending the Public Health (Preservatives, etc., in Food) Regulations are contained in a report by the Food Standards Committee on the use of chemical preservatives in food. It takes account of evidence received from the food industry and other interests, including those concerned with the enforcement of food and drugs legislation.

The committee review the changes which have taken place in the food industry since the existing regulations were framed in 1925, and conclude that some extension of the range of foods permitted to contain preservative is justified under modern conditions. They also consider that several substances in addition to those at present permitted might be allowed.

If the committee's recommendations were accepted all the foods at present permitted to contain preservative would continue to be allowed to do so; modifications are, however, suggested in the provisions applying to fruit pulp and other fruit products, soft drinks, pickles and sauces. Changes are also suggested in the present provisions for cured meats. The more important suggested additions to the list of foods permitted to contain preservatives are for bread to contain propionic acid; for flour confectionery, cheese and certain food adjuncts to contain sorbic acid; and for various canned foods and cheese to contain the antibiotic, nisin. The provisions relating to the treatment of citrus fruits have already been amended in accordance with the committee's recommendations.

In formulating their recommendations the committee have been guided by the principles that preservatives should only be employed in foods if their use has been expressly authorised; that additions should only be permitted in those foods where they have been shown to be necessary or advantageous, and then only in the amounts needed to achieve the desired effect; and that the addition should not give rise to any health hazard.

The committee recommend that the use of preservatives in food and advice on the need for changes in the regulations should be kept under review.

Publication of the report does not commit Ministers, and before deciding whether and to what extent the recommendations should be implemented, they will give full consideration to any representations made by interests concerned.

Such representations, from any part of the United Kingdom, should be addressed to the Assistant Secretary, Food Standards Division, Ministry of Agriculture, Fisheries and Food, Great Westminster House, Horseferry Road, London, S.W.1, to arrive not later than March 25, 1960.

Fish processing and distribution agreement

The Ross Group has signed a £1,000,000 contract for thousands of tons of superb quality deep sea fish all processed and quick frozen on the high seas. The other party to the agreement is Chr. Salvesen, owners of Great Britain's three fish factory ships. Mr. Jack Vincent, joint managing director of Ross Group, Ltd., stated that it was Ross Group's intention to reduce prices for *Fairtry* products from January 1, when the contract commenced, by using Ross Group's streamlined distributing organisation to the full.

From January 1, the total catch of the three ships will be marketed through Ross Group.

Brown and Polson's new Irish factory

The Irish Minister for Industry and Commerce, Mr. Jack Lynch, opened Brown and Polson's new factory at Goldenbridge, Inchicore, Dublin, on October 27.

The land, buildings, plant and machinery cost about £200,000, and on the main site, which covers 13 acres, there is enough space to expand the factory to six times its present size. Another site is also available. The factory employs over 150 people.

The factory manufactures and packs cornflour, custard, semolina, instant icing, instant pudding and dextrosol glucose. By an arrangement entered into in 1953 with the Kellogg Co. of Great Britain, Ltd., Kellogg Corn Flakes, Rice Krispies and Whole Wheat Flakes are being made, and Brown and Polson market and distribute Kellogg's products throughout the Irish Republic.

Meat hygiene codes

The Minister of Health and the Minister of Agriculture, Fisheries and Food have issued jointly two codes of practice on the hygienic handling of meat in course of transport and in the retail trade.

The codes have two broad aims: the meat should be handled and transported under the best possible conditions, and those handling it should not through familiarity treat it with less care than they would expect to have been given to meat which they eat themselves.

New Batchelors products are these jars of mixed vegetables and sliced onions.

Baking machinery agreement

The new Henry Simon—American Machine and Foundry agreement means that the complete range of AMF bakery equipment will be available to bakers in the United Kingdom and Eire and will be adapted by experienced baking engineers to suit methods and requirements on this side of the Atlantic. The range includes various types of mixers, provers and dividers, together with automatic roll-making plant, slicing and wrapping machines, and a variety of accessories.

Much of the AMF equipment is said to represent new concepts in baking technology, and Henry Simon stress that a complete service will be offered as well as a selection of new machines.

New Batchelors products

Two new products, mixed vegetables and sliced onions in jars, have been launched nationally by Batchelors Foods, Ltd. They represent a step in the extension of the company's range of food products and are the first moves in a long-term development programme.

(Left): **Mr. E. G. B. Gooding (second from left), head of the Processing Development Section of the Ministry of Food's experimental factory in Aberdeen, and Mr. W. R. Wilson (right), Area Marketing Director of the Fatstock Marketing Corporation, Ltd., North Scotland, on Aberdeen dockside with the consignment of processed and dehydrated meat given by FMC for the New Zealand Alpine Club Antarctic Expedition.** *(Right)*: **Sir Edmund Hillary at home with one of the parcels of meat.**

Leonard Hill to visit Kenya

Mr. W. Leonard Hill, Chairman of Leonard Hill Limited, publishers of FOOD MANUFACTURE, will be visiting Kenya in January and February. He will arrive in Nairobi on January 14 and will stay for four to six weeks. It is his intention to study agricultural and industrial affairs in Kenya, and he will be pleased to meet Kenya readers of this journal.

He can be reached through Group Captain C. G. Briggs in Nairobi or Poste Restante, G.P.O., Nairobi.

Dehydrated meat for Antarctic Expedition

The New Zealand Alpine Club's expedition to the Antarctic, organised with the help of Sir Edmund Hillary, will be able to feed on Scotch beef, lamb and pork, presented by the Fatstock Marketing Corporation, Ltd.

A new process of food dehydration developed at the British Ministry of Agriculture's experimental factory at Aberdeen, has made this possible.

Since about three-quarters of the weight and bulk of any meat consists of water, dehydration provides the answer. At the same time, the expedition's food must be appetising and taste good. One of the most appealing features of the Ministry's new process is that the meat when cooked now looks, as well as tastes, exactly like fresh cooked meat.

Quite large cuts can be treated whole. Until recently, dehydration was based on drying by warm air and the material to be dried had to be cut into small pieces or minced. The new process for dehydration is a combination of freezing and vacuum drying. This transforms the ice in the frozen food directly into the water vapour and enables the material to retain to a large extent its original texture and shape. This sublimation of ice (that is, passing from the solid to vapour without first becoming liquid) is in essence the same process which occurs when sheets are hung out to dry on a frosty day. The water freezes, making the sheets as stiff as boards, then "sublimates" and the sheets become dry without the ice first melting.

The Fatstock Marketing Corporation supplies the factory with all its meat. When it was learned that Hillary was organising another expedition, F.M.C. through its north of Scotland area marketing director, Mr. W. R. Wilson, presented the meat free of charge for processing by the Ministry's experts.

Sausage manufacturers' Golden Jubilee

A luncheon was held at the Trocadero Restaurant, London, W.1, recently to celebrate the Golden Jubilee of the Sausage Manufacturers' Association, which was founded in 1908.

In proposing the toast of the association, the president, Mr. Cecil W. Rodd, recalled a number of interesting points in the history of the organisation.

Replying to the toast, the retiring chairman, Mr. F. G. Pinnington, referred to the important part which the association must continue to play in ensuring the future well-being of the sausage manufacturing industry. He looked forward, he said, to an increasing demand by the public for the industry's products. His view on the ever-present problem of the shortage of home-produced pigs was that all interests concerned should get together to find a solution that was fair and equitable to all.

At the annual general meeting which followed, Viscount Trenchard, M.C., of T. Wall and Sons, Ltd., was elected chairman, in succession to Mr. F. G. Pinnington, of Hughes Bros. (Mfrs.), Ltd., who had served in this capacity for the past four years.

Company acquisition

Baker Perkins, Ltd., are to acquire the major part of the business of William Douglas and Sons, Ltd. The Baker Perkins Group will take over the refrigeration, bulk handling and general engineering business of the Douglas company.

A new subsidiary company—William Douglas and Sons (Engineering), Ltd.—will be formed. The assets used in the engineering activities of the present Douglas company will be transferred to the new one.

After the formation of the subsidiary, and the completion of contracts, it has been agreed that Baker Perkins will acquire the total share capital of the subsidiary. The purchase price of £260,000 will be satisfied by the issue of ordinary £1 shares of Baker Perkins.

Mr. W. S. Douglas will be the chairman of the new subsidiary and Mr. T. E. M. Douglas the managing director. Other directors to be appointed are Mr. L. G. Collins, Mr. A. I. Baker and Mr. N. Mountain.

Colombo Plan "students" visit

Nine Colombo Plan students, in Britain to study current techniques of preventing food infestation, recently visited the Cheadle Heath headquarters of Henry Simon, Ltd. The visit was arranged by the Ministry of Agriculture, Fisheries and Food, and a representative of the Ministry accompanied the party.

Although described as "students" under the Plan, it should be explained that the visitors were food industry executives and research officers from Pakistan, India, Thailand and the Philippines. They toured the experimental flour mill, the cereal laboratories and the engineering works, and were thus able to see their particular subject against a wider background of current developments in food technology.

The visitors also listened to a short talk on the latest techniques in silo fumigation, the speaker being Mr. M. S. Prance, from the silo department of Simon Handling Engineers, Ltd.

Nine food industry executives and research officers from overseas, in Britain under the Colombo Plan, are shown here visiting the Cheadle Heath headquarters of Henry Simon, Ltd., Mr. L. T. Collinson (left) is explaining the experimental mill.

Food in Parliament

The Government has refused to interfere with existing arrangements for butter and cheese distribution. It has resisted pressure from Labour M.P.s that control should be introduced to stop any further increases in price and to "ensure a fair distribution of butter and cheese."

In the Government's view, price control would do nothing to increase supplies and might, indeed, have the reverse effect.

The demands were sparked off by a temporary butter shortage, leading to reports that some shopkeepers were rationing supplies to customers. However, Mr. John Hare, Agriculture, Fisheries and Food Minister, told the Commons recently that the situation was easing with the seasonal increase in the rate of imports from New Zealand and Australia. Meanwhile, supplies continued to arrive from North America. Australian and New Zealand shipments alone totalled over 37,000 tons. And market prices had begun to change, he pointed out in answer to Labour accusations that "exorbitant prices" were being charged.

Pigmeat is being imported into Britain from Holland, Hungary and Poland, an M.P. protested, calling on the Government to restore confidence to home producers by making it clear that, if necessary, these foreign supplies will be controlled.

But he was told that, in accordance with this country's international obligations and general trade policy, restrictions have been lifted from nearly all commodities, including pigmeat from Western Europe.

Imports of pigmeat from the Soviet bloc are only allowed within quotas, however.

The Agriculture Minister is, of course, carrying out a general review of the whole pig industry which is at present undergoing a difficult period.

An M.P. has called for a war against sweet eating, lolly sucking and ice cream consuming, in the interests of children's teeth.

In Britain we eat about 8¼ oz. of sweets a week each—more than the people of any other nation in the world, said Mr. Norman Dodds (Labour, Erith and Crayford). He suggested children should be educated to "restrict their intake of carbohydrates"—the sugar causing dental decay. A wordy war should be declared on lollies. "Brand the ice cream and ice lolly vans that cluster daily around the school entrances as a menace to the health of children," he added.

A Government spokesman thought, however, that a campaign against sweets, lollies and ice cream would probably cost Mr. Dodds "his personal political career."

Food poisoning in 1958

According to Part II of the Ministry of Health report for 1958, "On the State of the Public Health," about 14,900 cases of food poisoning were reported either to the Ministry of Health or the Public Health Laboratory Service during the year. This figure was some 100 cases less than in the year before. Thirty fatal cases were reported.

As has always been the case in England and Wales, the foods most associated with the outbreaks were processed meats and made-up meats. Reheated meats, meat pies, cold meat, brawn, pressed meat and stew were the most commonly incriminated.

Six outbreaks were associated with freshly opened cans of meat, but in all cases it was noted that the cans were imported.

Brand merger

The marketing of *Tempo* and *Regent* products, has been merged, and the selling of both brands is now the responsibility of the Times Food Products Co., Ltd. (a subsidiary of Birds Eye Foods, Ltd.). Mr. E. Velden, a director of the Times Food Products Co., Ltd., has been appointed general manager of this company, and Mr. S. P. Norman will be the sales manager.

Mr. J. E. Day, previously sales manager of Regent Foods, Ltd., has taken up a new appointment with Birds Eye Foods, Ltd.

Change of address

The British Thomson-Houston London publicity office is now located at Crown House, Aldwych, London, W.C.2, Room 208. Tel.: TEMple Bar 8040, ext. 2.

Rugby publicity services remain as hitherto.

Change of name

It has been announced by Birlec, Ltd., that the company name has been changed to A.E.I.-Birlec, Ltd.

The change coincides with the final reorganisation of the structure of the parent company, Associated Electrical Industries, Ltd., into several product divisions. The internal organisation of Birlec, Ltd., will not be affected.

PEOPLE

MR. A. F. BATHURST has been appointed south-eastern counties of England representative by Dawson Bros., Ltd. He is an engineer and has had considerable experience with bottling plants both at home and overseas.

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MR. R. J. PLATTEN and MR. R. S. SMITH, senior technical representatives of Boxfoldia Ltd., have been appointed area sales managers.

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MR. M. J. SMEDLEY has been appointed advertising manager for the Smedley group of companies. This is a new position created to co-ordinate the company activities in both canning and quick freezing.

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The elected new board of directors of J. W. Towers and Co., Ltd. (recently acquired by A. Gallenkamp and Co., Ltd.), is as follows: MR. A. W. A. RUNDLE, chairman; MR. J. S. TOWERS; MR. J. P. OLDFIELD; and MR. H. F. KIRBY.

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Batchelors Foods, Ltd., have appointed two agricultural officers for their Sheffield and Ashford factories:

MR. A. P. J. PEETERS, B.SC., has been appointed at Sheffield, and MR. J. C. N. CARTER has been appointed at Ashford.

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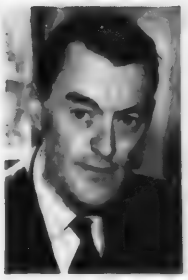
MISS MARY REYNOLDS, who has been in charge of the Unilever Food and Cookery Centre since its beginning in 1947, has relinquished her position. She was succeeded by MISS D. M. E. JORDY, who came from Van den Berghs, Ltd.

"Libel"

"Libel"—a drama of the Law Courts, was presented by the Dramatic Section of W. J. Bush and Co. Ltd., at the Cripplegate Theatre, London, E.C., during the week before Christmas. The annual presentation of these talented amateurs, inspired by the chairman of the company, Mr. Eric Bush, is always an enjoyable occasion. "Libel" takes place entirely in a court room and consists of closely reasoned arguments concerning the true identity of Sir Mark Loddon. This part was taken by Mr. Bush and he was extremely well supported by the opposing counsel, who argued the case with persuasion and authority. The suspense was extremely well maintained throughout three acts and the way in which the libelled baronet conclusively establishes his identity is an effective piece of drama.

Congratulations are due to all concerned for another excellent production to add to their long list of successes.

Mr. A. F. Bathurst



Mr. D. G. Elias

Mr. K. Beswick

Head of the new Henry Simon baking department will be MR. DAVID G. ELIAS, B.SC., who has been with the company for thirteen years and, as chief chemist, has worked on the development of many new processes and techniques, notably the protein displacement process (FOOD MANUFACTURE, 1958, **33** (11), 450). He has also written many articles on technical processes, and has held a part-time teaching post in breadmaking and cereal science at the Manchester College of Science and Technology.

In charge of the commercial organisation will be MR. K. BESWICK, B.A.(ECON.), formerly the chief accountant of the parent company Henry Simon (Holdings), Ltd.

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MR. WILLIAM MATHIESON and MR. JOHN DRAPER have been appointed as directors of Mono Containers, Ltd.

International Flavors and Fragrances Inc., have announced the following appointments to the flavour division of the company:

MR. HENRI VAN MAMEREN has been appointed general manager, and DR. JAMES H. MCGLUMPHY has been appointed technical director in charge of research, manufacture and product control.

Mr. van Mameren previously served as managing director of the Paris subsidiary of Polak and Schwarz, assistant to the president in the head office at Zaandam, and as general manager of the Polak and Schwarz subsidiary in Brussels.

Dr. McGlumphy has been associated with Van Ameringen-Haebler for more than 25 years, and is stated to be widely known throughout the industry, having served on many committees and as an advisor to the United States Government and the Armed Forces.

All competitors in the recent London to Brighton veteran car rally were regaled with hot tomato soup presented by H. J. Heinz Co., in flasks presented by the British Vacuum Flask Co. The picture shows the actresses Miss Hilary Tindall and Miss Marina Martin, in Edwardian dress, dispensing the good cheer.

Food News Overseas

Improved cans for acid foods?

According to a report from the American Can Co., the time for evaluating the service life of tin plate can be cut from 2 years to about 20 hr. using a new technique which measures electrochemical factors in the corrosion of tin plates. It is hoped that the technique may lead to the use of lighter tin coatings and resulting economies in manufacture.

In a test to simulate the conditions existing in a tin plate container containing grapefruit juice, the technique consists of producing a current of electricity between a tin plate sample " which has been detinned to the alloy state " and a pure tin substance while both are submerged in pure grapefruit juice containing soluble tin. Service life of the tin plate is indicated by measurements of the current flowing between the tin sample and the tin electrode after 20 hr.

Norwegian frozen fish sales up

The co-operative sales organisation Norsk Frossenfisk A/L, whose *Frionor* brand frozen fish fillets have won wide acceptance in the United States, reports a total production of 19,546 tons in 1958-59, with a gross sales value of nearly 67 million kroner (£3,350,000). Fillet sales were 12% higher than in 1957-58, and total exports increased by about 5 million kroner (£250,000). Exports to the United States alone were valued at 25 million kroner (£1,250,000), as against only 7 million kroner (£350,000) in the preceding year.

American machinery firms combine

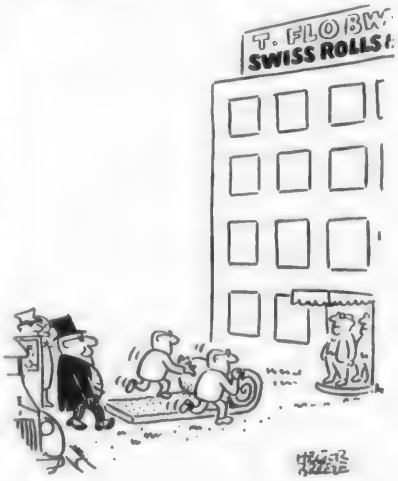
The Vacuum Candy Machinery Co. and the Racine Confectioners Machinery Co. have both been absorbed into the J. W. Greer Co. of Wilmington, Massachusetts, hitherto known principally for their manufacture of chocolate tempering, coating and cooling equipment. Amongst the Vacuum-Racine products which will eventually be manufactured by the Greer plant at Wilmington are chocolate and cream depositors, sucker machines, stick candy machines, automatic paper cup machines and an automatic cream extruder.

According to Mr. Don S. Greer, president of the J. W. Greer Co., this consolidation should benefit the confectionery industry in two ways. It puts larger and more powerful resources behind the Vacuum-Racine lines, thereby strengthening and accelerating their already active new product development programme. Furthermore, a number of Greer's research developments dovetail nicely with Vacuum-Racine products old and new, thereby improving and broadening both lines of equipment.

The American Greer Co. has long been closely associated with Bramigk and Co., Ltd., and the latter have for some years manufactured Greer equipment under licence in Great Britain.

Frozen foods committee

At its annual meeting in Lisbon, the Comité International Permanent de la Conserve decided to set up an additional committee to concern itself with frozen foods. In the first place the new committee will act as a kind of clearing house for information of a technical and scientific nature. It is not intended that the committee shall undertake investigations itself, but that it shall assist generally as a liaison between research and development and the freezing industry. Later on, it will probably also formulate problems requiring solution, especially those which arise in the course of international trade. Like the other committees of the C.I.P.C. it will not be exclusively scientific, but will concern itself also with such problems as arise out of labelling and hygiene regulations. Dr. Denis Dickinson has been put in temporary charge of the new committee, with the task of drawing up proposals for its programme. Any suggestions or enquiries should, therefore, be sent to him at the Fruit and Vegetable Canning and Quick Freezing Research Association, Chipping Campden, Glos.



Cheese bureau

The Swiss Cheese Union have opened a service and information bureau at Royalty House, Dean Street, London, W.1, for the purpose of developing their sales promotion in this country for the Swiss cheeses.

Overseas Enquiries

Hong Kong: Confectionery

Davie, Boag and Co., Ltd., Jardine House, Hong Kong, would like to represent a U.K. manufacturer of sugar and chocolate confectionery. They are considered to be a suitable connection for United Kingdom firms.

Manufacturers interested in this agency enquiry should write to Mr. G. Campbell, import manager of the Hong Kong firm, enclosing catalogues and giving detailed price lists. At the same time, they should notify the United Kingdom Trade Commissioner, P.O. Box 528, Room 1037-1040, 10th Floor, Alexandra House, Hong Kong, that they have done so.

Italy: Foodstuffs

E. Vismara di A. Biffi and Co., Via San Vittore S, Milan, would like to obtain the representation for Italy of U.K. manufacturers of tomato ketchup, kippers, curry powder, golden syrup (in 1 lb. tins), brown sugar (in 1 lb. packets), milk sherry and corn flour. They are considered to be a suitable connection for U.K. firms.

Manufacturers interested in this agency enquiry should write direct to Vismara di A. Biffi and Co. It would be appreciated if, at the same time, they would notify the Commercial Section, British Consulate General, Via Gabba 1a, Milan, that they have done so.

Italy: Provisions

ANIS S.r.l. (Ricard), Via S. Luca 2, Genoa, are interested in obtaining the representation for Italy of United Kingdom distillers of Scotch whisky, gin and wines and spirits in general, and also suppliers of tea, biscuits and similar foodstuffs. They are considered to be a suitable connection for British firms.

Suppliers interested in this agency enquiry should write direct to ANIS S.r.l. (Ricard). At the same time they should notify the Commercial Section, British Consulate General, Via Gabba 1/A, Milan, that they have done so.

Italian research in food preserving

Grants totalling $94,490 have been made to the Experimental Station for Food Preserving Industries in Parma, Italy, by the U.S. Department of Agriculture. $61,936 is for a study of chemical and physical changes occurring in beef during canning, and the other of $33,344 will finance research on the effects of transportation and distribution in the quality of canned concentrated peach and apricot purées.

Pest destruction in U.S.

Scientists of the U.S. Department of Agriculture have used heat from radio-frequency electric fields to kill in a few seconds flour beetles, rice and granary weevils, and lesser grain borers in stored wheat.

The radio frequencies used produce temperatures of 60-66°C.—hot enough to kill the insects while not damaging the wheat or rice. The Department of Agriculture is now trying to make the radio-frequency method commercially practical.

Kenya condensed milk plant

An initial production of 4 million cans of sweetened condensed milk a year is planned by the Kenya Co-operative Creameries in the new plant being installed in their depot at Naivasha, Kenya. The main part of the plant, a plate-evaporator, was purchased in the United Kingdom. The locally produced condensed milk is destined principally for the African market. At present about 280,000 cases of condensed milk, mainly from the United Kingdom and Holland, are imported into East Africa annually. The Naivasha production is expected to be 80,000 cases per annum.

Venezuelan flour mills

Venezuela's largest flour mill, Grandes Molinos de Venezuela S.A., is now in operation. It has a daily capacity of 7,000 bags of first quality flour plus 135 tons of by-products in the form of animal feed. It can also hold 13,000 tons of grain in storage. Construction cost was more than $6,600,000 (22 million bolivares). It is estimated that its production will supply about 5% of the country's flour consumption. The plant is situated near the Catia suburb of Caracas.

Pillsbury Mills Co. proposes to build a flour mill in Maracaibo, Zulia State, Venezuela. Paul S. Gerot, company president, said at the annual stockholders meeting that it is the company's first capital investment outside North America.

It will be a joint venture under a partnership agreement with a group of Venezuelan investors headed by Eugenio Mendoza, and will cost between $2 million and $2½ million. The mill will serve 5 or 6 states in western Venezuela, and have a capacity of 3,300 cwt. of flour a day. It is scheduled to get under way within the next three months.

Filipino flour mills

Establishment of 4 new flour mills in the Philippines, bringing the total number allowed to operate there to 6, has been approved by the Monetary Board. The 4 new mills will be operated by: Progressive Flour Mills, Inc.; the General Milling Corp.; Liberty Flour Mills, Inc.; and Puyat and Sons, Inc.

These 4 mills would entail an allocation of $4,455,660 for machinery and equipment, payable on a 5-year deferred payment plan. One of the mills would come from Switzerland, and 3 from Britain. Annual dollar requirements for raw materials and technical supervision would come to $21,468,408.

Annual authorised capacity of the 4 mills would total 160,000 metric tons, bringing the country's total—with the Wellington and Republic mills now operating—to 290,179 tons a year, against an estimated demand of 300,000 tons a year.

African cocoa prospects

The Western Nigeria Government aims at increasing its share of world cocoa production, and has already taken vigorous steps.

The government's agricultural policy says increased production is being achieved by the establishment of additional acreages under new high-yielding varieties of cocoa, and by increased efficiency on the part of cocoa farmers. These will ensure greater yields and cheaper production costs.

A major economic step taken this year was a subsidy scheme for approved spraying chemicals, insecticides and fungicides.

Last year 3,500,000 seedlings were distributed, according to Barclays Bank D.C.O. This year six million seedlings are ready for farmers, and from 1961 onwards at least 10 million seedlings will be available annually.

A small 2-acre trial plot of cocoa has been started in the Lower River area of Nyasaland, and hopes are expressed that it may lead to cocoa being an important export crop. From Blantyre, Barclays Bank D.C.O. says that it has been reported that there are few areas in the world where cocoa is being grown on soil of such high quality, and it is believed that when mature, the plot could yield up to £100 worth of cocoa per annum. Surveys have shown that there are about 20,000 acres of similar high-grade soil in the Elephant Marsh area of the Protectorate.

OBITER DICTA

● Essential for the fertility of male and female rats, vitamin E is given hopefully to infertile women.—*Sunday Times.*

● The average submarine cruise during the war lasted 42 days. One lasted 88 days, during the last five of which the crew ate only catsup.—*Food Processing.*

● I was absently gazing at the surface of a chocolate blancmange I'd made and was struck by how nearly it resembled the surface of the moon.—*Letter in New Scientist.*

● Because of the early and warm vintage, with the grapes picked in full sun, the early fermentation was tumultuous and temperatures at times reached dangerous levels.—*Press Bulletin.*

● Today's imports (of rice) would be sufficient, we expect, to provide a milk-pudding covering for all three lanes of the motorway to Birmingham and probably a good long way back. —*Travers' Circular.*

● Description of wine: "Crisp, playful, a bit naughty, sometimes even daring." Comment: "It sounds more like a passing pinch from an Italian in a crowded tram." — *Commander A. S. Hogg, Wine Mine.*

● A German firm would like to get in touch with a U.K. supplier of "Scottish Roe, deep frozen, unskinned, eviscerated, with head and feet, average weight 15 kg."—*Notice from Export Services Branch, Board of Trade.*

● The British bacon industry has asked Santa Claus for a nice fat subsidy for Christmas. I have asked for a nice rasher of bacon which does not taste like an old pink sock soaked for 20 years in the Dead Sea.—*Peter Simple, Daily Telegraph.*

● An English visitor to the Foire Gastronomique at Dijon, perhaps the greatest food fair in Europe, tells me that on the British stand he saw, among other national delicacies, tinned food for cats and dogs.—*Peterborough in Daily Telegraph.*

● The Duke of Edinburgh caused considerable amusement by saying that when he saw the magnificent buildings of the college and what vast sums had been spent on them, he realised what a good thing it was there were so many in the world with a taste for chocolate. — *The Times.*

Trade Marks

QUAKER.—780,812. All goods included in Class 29, but not including canned fish, canned meats, tinned fruits, tinned vegetables or condensed milk, or any goods of the same description as any of these excluded goods. **Quaker Oats, Ltd.**, Bridge Road, Southall, Middlesex.

PARK FARM.—B788,958. Jams and canned fruit. **Tesco Stores, Ltd.**, Tesco House, Angel Road, Edmonton, London, N.18.

SHEMTOV.—791,214. All goods included in Class 29. **M. Boxer and Sons, Ltd.**, 57 and 59, Commercial Street, London, E.1.

SONNY SUNGLOW.—786,627. Jams, marmalade, lemon curd, lemon cheese, table jellies, mincemeat, fruit preserves and vegetable preserves; and bottled and canned fruits. **Wm. Moorhouse and Sons, Ltd.**, Sunglow Works, Old Lane, Beeston, Leeds, 11.

DENO.—788,889. All goods included in Class 29, but not including tinned cream, ham or canned fish or any goods of the same description as tinned cream, ham or canned fish. **De Nordiske Fabriker De-No-Fa Aktieselskap**, Prinsensgate 2, Oslo, Norway.

DOTTO.—B791,581. Canned fruits and dried fruits. **Eric Wells, Ltd.**, Danes Inn House, 265, Strand, London, W.C.2.

CLOVER COUNTY.—791,902. Poultry (none being live). **Cowling, Ltd.**, 283, Kirkgate Market, Leeds, 2.

BLOOMOIST.—B771,129. Invert sugar for sale in Lancs., Yorks., Warwicks., County of Durham, Scotland and Northern Ireland. **Lochore and Ferguson, Ltd.**, Upper Inglestone, Greenock.

QUAKER.—780,821. All goods included in Class 30, but not including tea or any goods of the same description as tea. **Quaker Oats, Ltd.**, Bridge Road, Southall, Middlesex.

RAVOLETTI.—788,060. All goods included in Class 30. **Brand and Co., Ltd.**, Mayfair Works, 72-84, South Lambeth Road, London, S.W.8.

AROUND 4.—B789,132. All goods included in Class 30. **Meredith and Drew, Ltd.**, Murray House, Barbican, London, E.C.1.

DIP STICK.—792,930. Ice cream, ice cream confections, mixtures for making ice cream confections and water ices. **Pleasure Foods, Ltd.**, 350, King Street, London, W.6.

WALL'S DOUBLE DELIGHT.—791,026. Ice cream and ice cream confections. **T. Wall and Sons, Ltd.**, The Friary, Friars Place Lane, Acton, London, W.3.

CANDYGRAM.—791,296. Non-medicated confectionery. **Candygram, Inc.**, 611, North Sacramento Boulevard, Chicago, 12, Illinois.

MADHVANI.—B792,128. All goods included in Class 30. **Madhvani Sugar Works, Ltd.**, Plot No. 25, Main Street, Jinja, Uganda.

ROUND THE CLOCK.—793,140, and **MAGIC CIRCLES.**—793,141. All goods included in Class 30. **Meredith and Drew, Ltd.**, Murray House, Barbican, London, E.C.1.

COUNTESS.—793,218, and **PRINCESS.**—793,220 Tea. **George Payne and Co., Ltd.**, 21 to 24, Queen Elizabeth Street, London, S.E.1.

HIGH JINKS.—786,432. Processed and salted nuts included in Class 29. **H. S. Whiteside and Co., Ltd.**, Parkhouse Works, Parkhouse Street, London, S.E.5.

Recent Patents

825,103. G. A. GRAY: Machine for drying and polishing cocoa beans.

825,161. BAKER PERKINS, LTD.: Feeding dough pieces into dough pans or tins for breadmaking.

825,432. M. BEAUVAIS: Cooking apparatus for food products in tins.

825,522. BAKER PERKINS, LTD.: Apparatus auxiliary to the removing of tinned bread from tins.

825,523. BAKER PERKINS, LTD.: Apparatus for removing tinned bread from tins.

ABSTRACTS OF BRITISH PATENTS

Dispensing aerated liquids

The performance of apparatus for dispensing aerated liquids is improved by feeding the liquid to the dispensing device from the supply container through a conduit, a major portion of the length of which has an unobstructed bore and a cross sectional area which increases progressively towards the dispensing valve and, as a result, the pressure of the liquid at the dispensing valve is reduced.—822,343. *Pepsi-Cola, Ltd.*

Raw fodder conversion

Raw fodder is converted into silage which is substantially free of oxygen by crushing and then acidifying to a *p*H value of about 5, after which the crushed and acidified fodder is introduced into a silo and covered with a sheet of synthetic resin material—822,344. *V.V. Maatschappij Tot Exploiteren Van Octrooien En Licenties "Matepa."*

New patents are from the Journal of Patents and new trade marks are from the Trade Marks Journal. In each case permission to publish has been given by the Controller of Her Majesty's Stationery Office. Each of the publications is obtainable from the Patents Office, 25, Southampton Buildings, London, W.C.2.

Notes for Contributors and Authors

The Editor of FOOD MANUFACTURE welcomes articles, news items and other contributions on all aspects of food production.

The purpose of this journal is to exchange information between all those concerned in the food industry. Articles should therefore be written in a readable style, avoiding esoteric terminology and technical jargon, and should contain factual and practical information.

A preliminary synopsis should, preferably, be sent to the Editor, and the contribution itself should be typed in double spacing on one side of the paper only. It should bear the name and address of the author and should be accompanied by photographs suitable for illustrations.

New Companies

Ainsleys (Headingley), Ltd. (640424.) 15, St. Michael's Lane, Headingley, Leeds. To carry on the bus. of bakers. £1,000. Dirs.: E. V. and Edith M. Ainsley.

Associated British Maltsters (Southern), Ltd. (640714.) St Johns Road, Wallingford, Berks. Maltsters, malt roasters, malt factors, etc. £1,000. Subs.: J. Thomson and M. J. Ordish, 11, Old Jewry, London, E.C.2.

Associated British Maltsters (Eastern), Ltd. (640715.) New Cut, West Ipswich. Other details similar to Associated British Maltsters (Southern), Ltd.

Canteen Supplies (London), Ltd. (639196.) 1-2, Finsbury Square, London, E.C.2. Dlrs. in, packers, canners, and bottlers of fruit, vegetables, farm and dairy produce, etc. £2,000. Dirs.: Edward Sofocleous, H. G. Ottolah and Anthony Fabri.

Coq d'Or Chocolates (1959), Ltd. (640830.) Avondale Road, Cheadle Heath, Ches. £20,000. Dirs.: D. R. Adams, Mrs. Madeleine I. Brennan, K. E. Reed, and George Wienholt.

George Calvert, Ltd. (640555.) 22, Vulcan Street, Leeds, 7. Fat rfnrs. and mnfrs. of and dlrs. in dripping, etc. £30,000. Dirs.: George Calvert and Miss Ruth E. White.

Duche and Spice and Co., Ltd. (641833.) Preparers, processors, refiners, grinders, blenders, and packers and preservers of nut kernels, cocoa beans and fruit, vegetable and mineral and other produce, etc. £50,000. Subs.: D. H. Tate and Chas. Hodgkinson, 18, Austin Friars, London, E.C.2.

Filgrise, Ltd. (639209.) To carry on the bus. of mnfrs. of and dlrs. in foods, drinks, sweets, confectionery, etc. Subs.: Jean and Thomas A. Herbert, 156, Strand, London, W.C.2.

Fogel Patisserie, Ltd. (641188.) 7, Upper St. James Street, Brighton. Biscuit mnfrs., bakers, etc. £100. Dirs.: Zelig and Mrs. Rebecca Fogel.

Hackings of Rossendale, Ltd. (639175.) 723, Bacup Road, Waterfoot, Rossendale. Bakers, pastrycooks, flour millers, etc. £2,000. Dirs.: Ronald and Mrs. Kathleen Hacking, and G. W. and Mrs. Doris Hacking.

E. Harding and Son (North Shields), Ltd. (640200.) Back Coach Lane, North Shields. To take over the bus. of sausage casings and tallow mnfrs. and fat refiners carried on as "E. Harding and Son" at North Shields, etc. £10,000. Dirs.: Eva, G. R. and Wallace Hub.

Organic Food Society, Ltd. (642109.) Company limited by guarantee without share capital. The income and property of the Society, whencesoever derived, shall be applied solely towards the promotion of its objects. Council: Rt. Hon. Lord Kitchener, 435, Chester Road, Hartford, Northwich, Ches., Miss H. R. Murray, Samuel Mayall, Jean M. Seager, Russell Bailey, Kenneth A. H. Bayes, Mrs. Elizabeth Murray and W. K. Kennedy.

These particulars of new companies recently registered have been extracted from the daily register of Jordan and Sons, Ltd., Company Registration Agents, 116, Chancery Lane, London, W.C.2.

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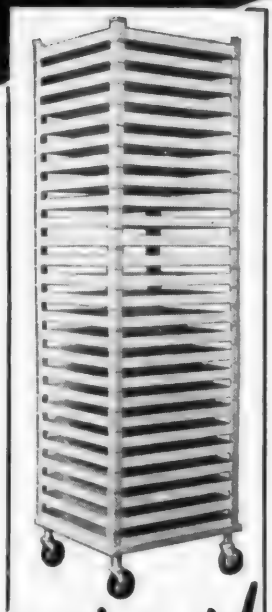

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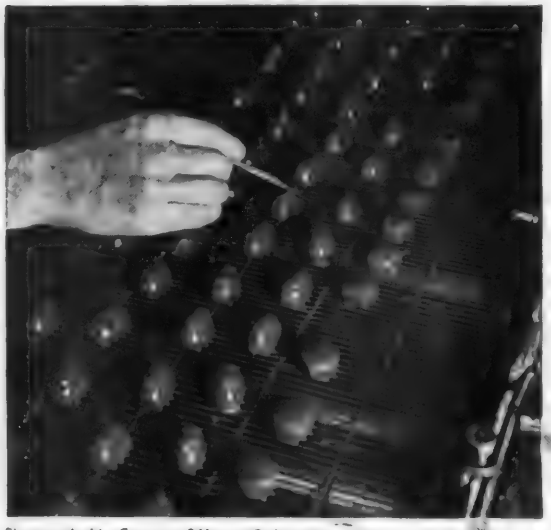

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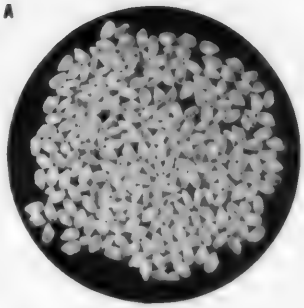

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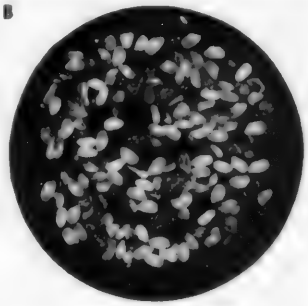

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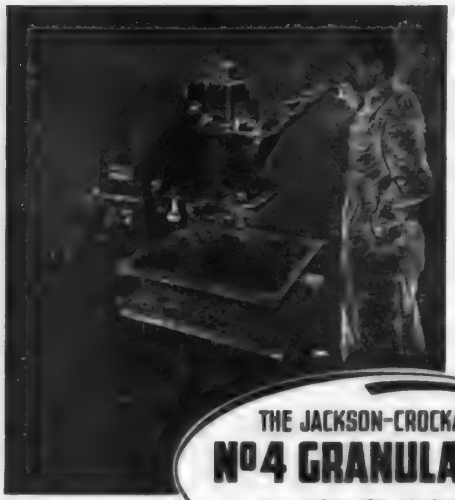

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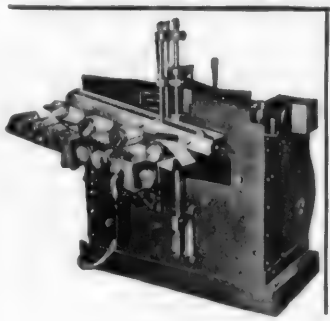

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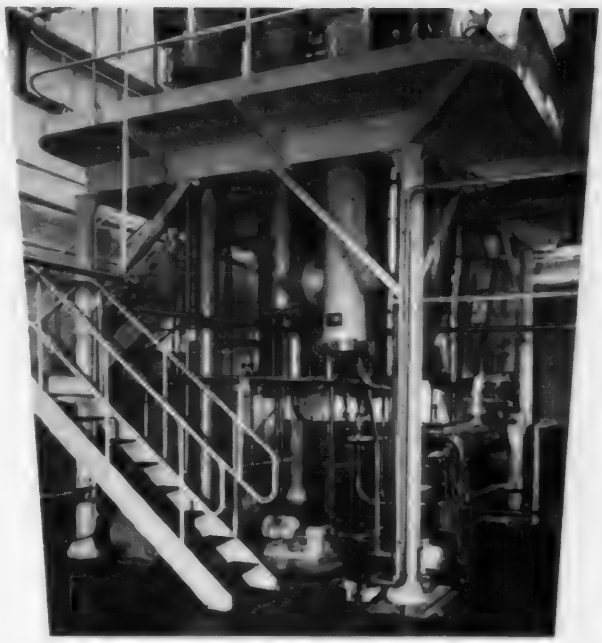

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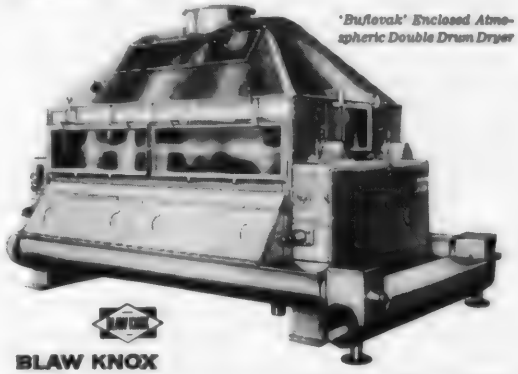

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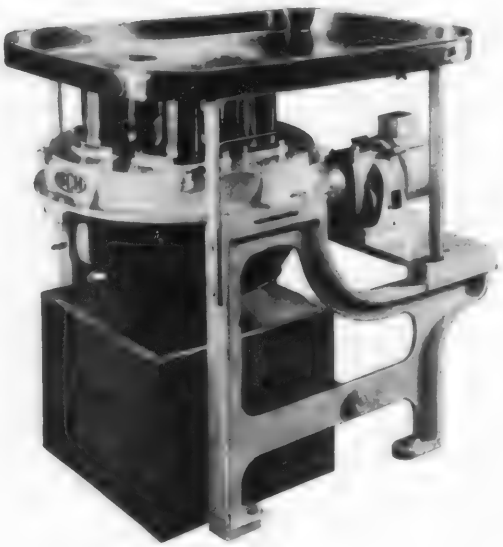

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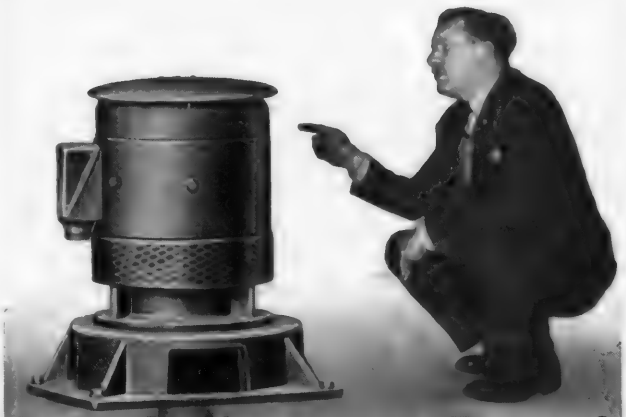

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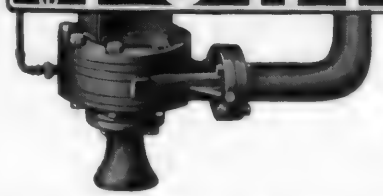

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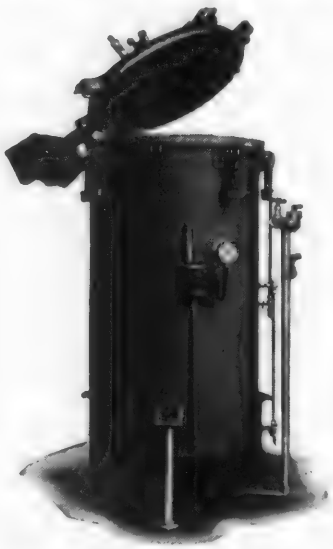

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THE Owners of Patent No. 756,109, which concerns *Process and Apparatus for the Manufacture of Synthetic Skin Structures, more especially Sausage Casings*, are desirous of arranging by way of Licence or otherwise, on reasonable terms for the commercial development in Great Britain of this invention. —For particulars address Elkington and Fife, 329, High Holborn, London, W.C.1.

THE proprietor of United Kingdom Patent No. 714065 which relates to *A purifying centrifuge for the separation of bacteria and microscopic particles from viscous liquids and emulsions*, is desirous of entering into negotiation with parties who may be interested with a view to the grant of a licence to work the invention in this Country or for the sale of the Patent out-right. Communications in the first instance should be addressed to G. F. Redfern & Company, Redfern House, Dominion Street, London, E.C.2.

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Ref. A.123. British. Male. Age 35. Married. H.N.C. Mechanical Engineering, O.N.C. Electrical Engineering. 6 years student apprentice-draughtsman, general heavy engineering. 2 years with civil and mining engineering company, surveying, prospecting, management. 5 years Assistant Manager and 3 years Manager, Lead and Zinc Mining and Dressing. 1 year Mining Engineer West Africa—Iron Ore. 2 years Assistant Manager, lead mining and dressing. 1 year Mining Engineer (Prospecting) Gold and Tin mining, West Africa. Seeks appointment as Mining Engineer (Metalliferous), Prospecting, Mining or Mineral Dressing or Associated work, preferably U.K. but would consider anywhere. U.K. salary £1,250 p.a., abroad £1,500 p.a.

Ref. A.124. British. Male. Age 43. Married. A.M.I.Prod., A.R.Ae.S., M.I.Plant.E. 15 years R.A.F. F/Lt., including angg. duties. 8 years self-employed Instrument and general light precision engineering. 7 manufacturing 2½ years Works Engineer, General and Production Engineers (Light/Medium). Seeks appointment Midlands, Design and Development Engineer, Consulting Engineer, Production Engineer or Mechanical Engineer. Salary £1,250 p.a.

Ref. A.125. British. Male. Age 45. Married. O.N.C., A.M.I.Plant.Eng. 1½ years Draughtsman gear box and lift manufacturers. 10 years R.A.F. Navigator. 6 years R.A.F. Engineer. 3 years R.A.F. Apprentice. At present Personal Assistant to Engineering Manager. Seeks post as Personal Assistant or Recording Engineer U.K. (Colchester area preferred). Salary £1,200.

Ref. A.126. British. Male. Age 43. Married. Member Institute of Engineering Inspection., Associate Member American Institute of Electrical Engineers. Experience: 3 years Electrical Apprenticeship, electrical contractors. 2 years Service Engineer Electrical. 7 years R.A.F. Electrical Fitter and Engineer. At present Chief Inspector Electrical Test. Electric Wires, Cables, Cords, Connectors. Seeks post anywhere in Commonwealth or U.S.A. as Inspector or Test Engineer. Salary £1,000 p.a.

Ref. A.127. British. Male. Single. Age 34. B.Sc. (Eng.). Experience: 8 years Civil Engineering Consultants. At present Ministry of Works abroad. Seeks appointment Far East or West Africa as Civil Engineer.

Ref. A.128. British. Male. Single. Age 30. Experience: 3 years Technical Clerk, aircraft manufacturer. 3½ years Spares Engineer Aircraft Manufacturer. Seeks appointment S. England, London preferred, compatible with previous experience. Salary £728 p.a.

Ref. A.129. British. Male. Married. Age 27. O.N.C. (Mechanical), 1st Class M.O.T. (Motor), applied for A.M.I.Mar.E. 5 years Apprenticeship repairers and engineers. At present employed shipping company as Marine Engineer (Senior Second). Has had complete charge of cargo liner engine rooms—running and maintenance of main and auxiliary machinery. Good working knowledge electricity. Seeks post Technical Engineer, Development Engineer, Maintenance Supervision, Southern England. Salary £950 p.a. minimum.

Ref. A.131. British. Male. Age 37. Married. A.M.I.Mech.E. 3 years apprentice diesel engine manufacturers. 3½ years Assistant to Manager, general engineers. 1½ years Assistant engineer Consulting Engineers. 5 years Army. Knowledge contracts—electrical and production and aircraft industry. Seeks post Engineering Sales or Management. London or Provinces—would also consider abroad. Salary £1,200 p.a.

Ref. A.132. British. Male. Married. Age 31. O.N.C. Inorganic Chemistry, Elect.Ord.Grade Gas Engineering (Manufacture). 6 years pupil engineer Gas Company. 2 years Fuel Technician steel works. 2 years Technical and Chemistry Assistant Gas Board. At present operating and constructional engineer Retort House and Coke Oven Construction. Seeks post as Area Representative or Engineer S. or S.W. England. Salary £1,000 p.a.

Ref. A.133. British. Male. Married. Age 41. A.F.R.Ae.S. 2 years Technical Representative aircraft manufacturers. 8½ years Senior draughtsman aircraft manufacturers. 4½ years Liaison Engineer. 3½ years Project Engineer aircraft manufacturers. 1 year Senior Designer, astronautics. Seeks post Engineer or Technical Representative London, Surrey or America. Salary £1,200 p.a. minimum.

Ref. A.134. British. Male. Married. Age 22. Bakery Diploma. 16 months trainee manager, food manufacturers. 2 years practical experience bakers and confectioners. R.A.F. service as Pastry Cook. Has taken full course in Chemistry and interested in the Testing of Raw Materials. Seeks appointment as Test Baker or Bakery Chemist, anywhere, salary £753 p.a.

Ref. A.135. British Male. Age 47. Inter. B.Sc., Member of Inst. of Packaging. Experience: Asst. Packaging Manager for 5 years with manufacturing chemists, pharm. and vet. 4 years Dept. Manager, manufacture and packaging food manufacturers. 1 year Process Asst. Manager, Fuel Oil Co. 1 year Anal. chemist, food manufacturers. 3 years Prod. Manager, manufacture and packaging, food manufacturers. Considerable experience cordials, sauces, pickles, fish and meat pastes, individual wrap, containers, closures, seals. Now seeks Permanent Appointment Managerial/Executive/Development, London or Home Counties. Salary £1,000/£2,100 p.a.

Ref. A.136. Indian. Male. Resident U.K. B.Sc. (Chem.), M.S. (Bacteriology and Biochemistry). Age 38. Single. Experience: 1 year Research Assistant, Institute for Enzyme Research (U.S.A.). 6 months Bacteriologist food manufacturers. 7 years Scientific Officer food manufacturing research organisation. Seeks permanent appointment London area. Salary £1,000 p.a.

Ref. A.118. British Male. Married. Age 27. Knowledge French, German and R.S.A.I. Russian. Last 7 years employed as fuel technician, iron and steel company. Seeks posts as Translator, using languages as above, U.K. Salary £900.

Ref. A.138. British. Male. Age 31. Married. B.Sc. Elec. Engg. Graduate I.E.E. 2½ years graduate apprentice and junior engineer Power Station. 1 year Technical Assistant transformer test department electrical engineers. 2 years Senior Engineer Research Department aircraft company. 3 years Asst. Electrical Engineer Manufacturing Company. Seeks post Bristol, S. or S.W. England, New Zealand or Australia as Electrical Engineer. Salary £1,200 p.a. minimum.

Ref. A.139. British. Male. A.M.I.Mech.E., M.I.Plant.E. Age 35. Married. 2 years Air Engineer Officer, R.N. 3 years Technical Assistant prototype development. 6 years project engineer metal container manufacturer. 2 years Experimental officer atomic energy. At present Deputy Chief Trials Engineer missile manufacturer. Seeks post London area as Chief or Deputy Chief Engineer, Asst. Works Manager or Plant Engineer. Salary £1,450 p.a.

Ref. A.140. Polish. Resident U.K. Single. Age 26. B.Sc. (Eng.), Chem. Eng. London University. Just graduated. Speaks, reads and writes Polish and Russian, technical if necessary. Main interests: Curve Analysis and Logical Equipment Design. Seeks post as Junior Chemical Engineer Manchester or London areas. Salary £800/£850 p.a.

Ref. A.146. Indian. Male. Age 25. Single. B.E. (Civil). 1½ years Junior Engineer designing and detailing of irrigation structures and residential quarters. 3 months Assistant Engineer design and detail of R.C. multi-storeyed residential buildings and offices. Seeks post London as civil or structural engineering assistant or Designer/Draughtsman. Salary £620 p.a.

[Continued overleaf

To: I.S.I.S. Appointments Register, 9, Eden Street, London, N.W.1. Please ask the following applicants to communicate with the undersigned:

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For each person engaged the equivalent of one weeks salary payable by the employer within fourteen days of the date of engagement.

Signature..... Date.....

I.S.I.S. APPOINTMENTS REGISTER (Continued from overleaf)

Ref. A.141. British. Male. Age 31. Married. Civil and Struc. Engg. Diploma. 1 year student engineer Civil Engineering Contractors. 2 years Articled Pupil Engineer and Surveyor. 6 months Site Engineer Civil Engineering contractors. 5 years Section Engineer and Site Agent Civil Engineering and Building Contractors. 4 years Civil Engineer with Consulting Engineer. Seeks post London or Surrey as Civil Engineer or "on the fringe of Civil Engineering." Salary £1,500-£1,600 with definite prospects.

Ref. A.142. British. Male. Age 35. Married. A.R.C.S., B.Sc., Ph.D., D.I.C. Experience: 2 years in charge of research section, main laboratories jam, jelly, canned fruit and vegetable. 2 years University research related to food preparation, etc. 4 years Senior Biochemist with fertiliser manufacturer. Seeks appointment S. England, Australia or Commonwealth in general. Salary £2,000 min.

Ref. A.175. B.Sc. Chem. British. Male. Age 33. Married. 1 year Works Chemist plastic raw material manufacturers. 3 years Ch. Technologist, rubber and plastics manufacturers and moulder. 3 years Technical Manager Plastics and Chemical manufacturers. 3 years Marketing Department oil company. Seeks Technical Management or Development post plastics/allied field/market research. London preferred.

Ref. A.143. British. Male. Age 65. Married. B.Sc. E.E. Hons. (U.S.A.), D.I.C. (London). 2½ years Electrical Inspector/Testing Engineer largest Electrical Supply Company U.S.A. 5 years Research and Electrifications, etc., railways and manufacturers U.S.A. 20 years teaching Electrical Engineering and Administration, Technical Colleges India, Pakistan and Ceylon. 2 years Technical Secretary and Editor of Journal of engineering institution, India. 5 years Consulta t in India. Author of Laboratory book in Electrical Engineering. Seeks post London, Provinces, Ireland, abroad, part or full-time considered, Electrical Research or testing—heavy side. Organising/training schemes of apprentices in electrical manufacturing companies or assisting that department. Reviewing, proof reading. Technical Correspondent. Salary £1,000-£1,500 p.a.

Ref. A.144. British. Male. Married. Age 45. A.M.I.Prod.E. 7 years apprenticeship, later technician manufacturing photographic optics Germany. 4 years work study then in charge of inspection and progress U.K. manufacturer of photographic cameras. 14 years Technical Manager, then Technical director manufacturer photographic instruments. 2 years Technical Manager manufacturer precision optics. Seeks appointment Technical Management of small firm or Senior Jig and Tool designer, or Production Engineer or Product Design. London, Birmingham, Provinces or Israel. Salary £1,500 p.m.

Ref. A.145. British. Male. Married. Age 44. O.N.C. (Mech.). 3 years rigger-fitter Aircraft. 1½ years Design or Draughtsman, Engineering. 6½ years Aircraft industry Project Designer Draughtsman, Structural and Electrical Installation. 3 years Senior Project and Designer Draughtsman, Structural and Electrical Installation Aircraft and Guided Weapons. Seeks appointment London, Surrey as Senior Project and Designer Draughtsman. Salary £980 p.a.

Ref. A.147. British. Male. Married. Age 29. O.N.C. (Mech.), 4th Year H.N.C. (Mech.). 5 years apprenticeship (Toolmaker) Light Electrical Engineers. 2 years Gun Fitter (National Service). 2 years Plant Layout Draughtsman Light Electrical Engineer. At present Senior Draughtsman with Consulting Engineer. Seeks appointment London, preferably N.E. or E. as Senior Draughtsman with salary £936 p.a.

Ref. A.148. British. Male. Age 36. Married. B.Sc. (Elec. Engg.), A.M.I.E.E. 1½ years Owner/Manager transport and engineering. 6 months Sales Engineer Commercial Vehicle Sales. 1 year Asst. Workshops Manager, atomic energy. 1½ years Development Engineer, Engine manufacturing. 1½ years Senior Control Engineer electrical manufacturing. 1½ years Distribution Engineer Mining (Australia). Seeks post London or S.E. England as Executive Engineer. Salary £1,600 p.a.

Ref. A.149. British. Male. Married. Age 29. B.Sc. in metallurgy, at present employed in development of production processes, atomic energy. Interested in electro-mechanical devices and now seeking a post in Technical Sales leading to executive position which pays by results. U.K. (not London). Salary £1,250 p.a.

Ref. A.150. Indian. Male. Age 30. Single. Inter. B.Sc., Dip. Textile Technology, City & Guilds Dip. Final Spinning. 7½ years Supervisor—preparatory. Various departments Jute factory. Able to type and write technical features. Seeks appointment U.K. (London preferred) or abroad as Assistant in textile factory or office; stores, publicity, etc. Salary £750-£1,000 p.a. or would consider joining company as trainee-officer in Stores, Purchase, Sales, Publicity or Administration.

Ref. A.151. British. Male. Age 35. Married. Diploma Aeronautics, Inter. B.Sc., A.F.R.Ae.S. 2 years Technical Assistant Aerodynamic and Engine research. 14 years Experimental Engineer engine research and development. Seeks appointment U.K., France, Italy, Germany or would consider anywhere, as Engineer Executive. Salary £1,800 p.a.

Ref. A.152. British. Male. Married. Age 36. H.N.C. (Mech.), H.N.C. (Elec.). Experience: 6 years test bed, switchgear manufacturers. At present employed in technical sales, responsible for co-ordinating sales, production and buying, interested metal products. Has completed 3 years part-time course in management studies. Seeks administrative or technical sales (Engineering) appointment in London. Salary £1,100 p.a. minimum.

Ref. A.153. British. Male. Age 36. Married. H.N.C. (Mech.) endorsed with "Indust. Admin." Apprentice machine tool manufacturers. 1 year Draughtsman—aircraft production. 4 years Refinery Plant operator, oil refiners. 6 years Service Engineer manufacturers of plant for food industry. At present Field Engineer, resident engineers staff (construction) with oil refiners. Seeks appropriate appointment anywhere but U.K. Salary £1,000 p.a.

Ref. A.154. British. Male. Married. Age 29. O.N.C. Elec. Engg. 6 years apprentice electrical engineers. 1 year Shipping (M.N.) 3rd Electrical Engineer and 4½ years 2nd and 1st Electrical Engineer. Seeks post U.K. (not London) as Senior Electrical Draughtsman or Engineer. Salary £1,100 p.a. minimum.

Ref. A.155. British. Male. Married. Age 71. Ph.D. Experience: 4 years Chemist, Germany. 4 years Chemist and Works Manager, Germany. 5 years Chemist and Controller, Germany. 24 years Managing Director and Chief Chemist of U.K. Company of Wax Blenders. Would like to find Library or Administrative post, part time considered. Salary is not of primary consideration. Fluent German. Working knowledge of French.

Ref. A.156. British. Male. Age 38. M.Inst.B.E., Certs. of National Building Course. 6 years draughtsman Local Authority. 3½ years senior building and civil engineering draughtsman, Chemical Manufacturers. 2½ years senior architectural draughtsman, Electricity undertaking. 6 months Chief Methods Engineer builders. 6 months Structural Draughtsman, reinforcement suppliers. 2 years Asst. Clerk of Works manufacturers of internal combustion engines. Seeks appointment U.K. in any building supervisory post or maintenance manager to an engineering concern. Salary £1,500 p.a.

Ref. A.158. British. Male. Married. Age 26 H.N.C. Mech. Eng., City & Guilds Cert. Motor Vehicle. 6 years apprenticeship fitter with automobile engineers. 2 years R.A.F. fitter. At present draughtsman with aero-engine manufacturers. Seeks post U.K. preferably N. England and as Development Engineer or similar. Salary £900-£1,000 p.a.

Ref. A.159. British. Male. Married. Age 27. B.Sc. (Eng.) Elec. Power, Grad.I.E.E. 6 years graduate apprentice semi-conductor manufacturer railway signalling and air brakes. 1½ years design and development of magnetic amplifiers, guided missiles. At present Technical Sales and Design Engineer equipment for printing trades. Seeks post London, Essex, Home Counties, maintenance, production or technical sales.

Ref. A.160. British. Male. Married. Age 39. A.M.I. Eng. Designers. Experience: 16 years draughtsman/estimator/representative, Pipework Engineers. 9 months representative Pipework Engineers. 1¾ years representative Industrial Refrigeration and pipework fabricators. Experience covers pressure vessels, heat exchangers, tanks and general welded fabrication to the usual codes of practice, i.e. A.P.I., A.S.M.E., Lloyds, A.O.C.T. T.E.M.A., etc. Also experience of obtaining materials and general purchasing. Seeks post as Representative or Estimator, London or Southern Counties. Well known in oil and chemical industries.

Ref. A.161. Italian. Single. Age 23. Male. Qualified Italy in drawing and architecture. Employed as engineer for 3 years with Italian engineering company specialising in building of bridges and roads. Seeks appointment in London as draughtsman. Salary £600 p.a. approximately.

Ref. A.162. British. Male. Single. Age 39. H.N.C. standard in Chemical and allied subjects. Experience: 2½ years Senior Shift Engineer chemical engineers. 6½ years Experimental officer Min. of Fuel & Power. 6 months Shift Engineer i/c of production furnace, special refractory and insulating brick manufacturer. 1 year contract operator i/c of plant, oil refiners abroad. 4 years Works Chemist, cannon shells and cases. 2 years Works Chemist, detergents and toilet preparations manufacturer. Engineer, Technical Supervisor, Development Chemist or Engineer Control Chemists, etc. Salary £1,000 approximately p.a.

Ref. A.163. British. Male. Age 36. Married. O.N.C. and H.N.C. (Aero), A.F.R.Ae.S., G.I.Mech.E. 5 years aircraft apprentice. 1 year Planning Engineer aircraft designers and constructors. 2 years Air Engineer Officer, R.N. 5 years Chief Flt/Eng. Officer British airline. 6 months Test Observer, aero-engine designers. 5 years Senior Technical Representative aircraft designers-constructors. At present i/c Planning Section aircraft designers-constructors. Seeks Managerial/Executive/Senior Technical appointment U.K. (London or S. England preferred). Minimum salary £1,250 p.a.

Ref. A.164. British. Male. Age 24. Married. Near completion of course in Engineering Draughtsmanship and Design. Experience: 8 years Wood Machinist, furniture manufacturer. Now seeks permanent appointment as Junior Draughtsman, London. Salary £12 p.w.

Ref. A.165. British. Male. Age 41. Married. B.Sc. Chem., F.R.I.C. by exam. in Organic Chem. 10 years progressive posts rising to Res. Chem. Oil Co. 4 years Chief Chemist Oil Company. 1 year Technical Adviser, Chemicals with Petroleum Company. 1 year Deputy Chief Chemist S. Africa Govt. project. 1 year Technical Manager oil re-refining and manufacturing project, S. Rhodesia. 6 months Senior Technical Officer, standards bureau. 3 years Project Chemist Patent and Licensing Division oil products and petroleum products, petrochemicals, also paints and allied products and sales technical service works, especially in chemical products. Good knowledge of Spanish and French. Seeks senior technical overseas appointment, e.g. Lab. management, management of an overseas corporation, sales technical advisor, Latin America, E. or S. Africa, Europe or U.S.A. with British company. At present resident U.S.A.

Ref. A.166. British. Male. Age 32. Married. Apprenticeship in General Engineering. 1½ years Maintenance Engineer engine manufacturers. 8 years Installation Engineer Bakery, Chemical and General Gnrs. Seeks post anywhere as Installation Engineer Salary £1,200 p.a. Has experience site management and control of labour.

Ref. A.167. British. Male. Married. Age 36. Experience: 12 years Works Manager engineering. At present employed as Production manager, light mechanical engineering and toolmakers. Seeking post as Works Manager, engineering. Anywhere in U.K. Salary £1,500 approximately.

Ref. A.168. British. Male. Married. Age 25. O.N.C. and H.N.C. and Endorsements (I.E.E.). Has completed 2 years training course for Higher Management. At present foreman-electrician, coal mining. Now seeking appointment U.K. or abroad as Electrical Engineer. Salary £950 p.a.

Ref. A.169. British. Male. Married. Age 37. M.I.Mar.E., M.I.Plant.E. 7 years apprentice, maintenance engineer glass makers. 5 years marine engineer shipowners. 1½ years. Engineer-Surveyor, insurance company. 1 year lubricants representative, oil refiners. 2 years Chief Engineer shipowners. 5 months foreman of development workshops, glassmakers. At present Asst. Works Engineer electric cable makers. Seeks post London or Provinces as Chief Works Engineer, Plant Engineer or similar. Salary £1,600 p.a. minimum.

Ref. A.170. British. Male. Age 24. Married. Dipl. Mech. Eng. At present employed as Design Draughtsman, diesel engines and hydraulics. Seeks post 50 miles radius London as Designer. Salary £950 p.a.

Ref. A.171. British. Male. Single. Age 26. B.Sc. Mech. Eng., Grad.I.Mech.Eng. At present employed as Development and Research Technician aero engines. Seeks post Development or Research Technician (Mech.). U.K., preferably S. Midlands. Salary £900 p.a. minimum.

Ref. A.172. British. Male. Married. Age 28. O.N.C., H.N.C. Mech. & Prod. Eng., City & Guilds welding and machine shop, Grad.I.Mech. and I.Prod.Eng. Student Apprentice. 4 years tool room, 1 year drawing office, tool trials and research. At present tool engineer automobile manufacturer. Seeks post London or Luton area as Technical Manager or Tool Engineer (Planning). Salary £1,200 p.a.

Ref. A.174. British. Male. Married. Age 32. O. and H.N.C. Mech.G.I.Mech.E. 5 years fitter and turner apprentice, marine engineers. 7 months junior draughtsman, marine engineers. 7 years Sales/Contracts Engineer, Mechanical/Electrical Engineers. 2½ years Contract/Project Engineer nuclear power. Seeks post Commercial Engineer/Asst. Commercial Manager. U.K. (Manchester preferred). Salary £1,500 p.a.

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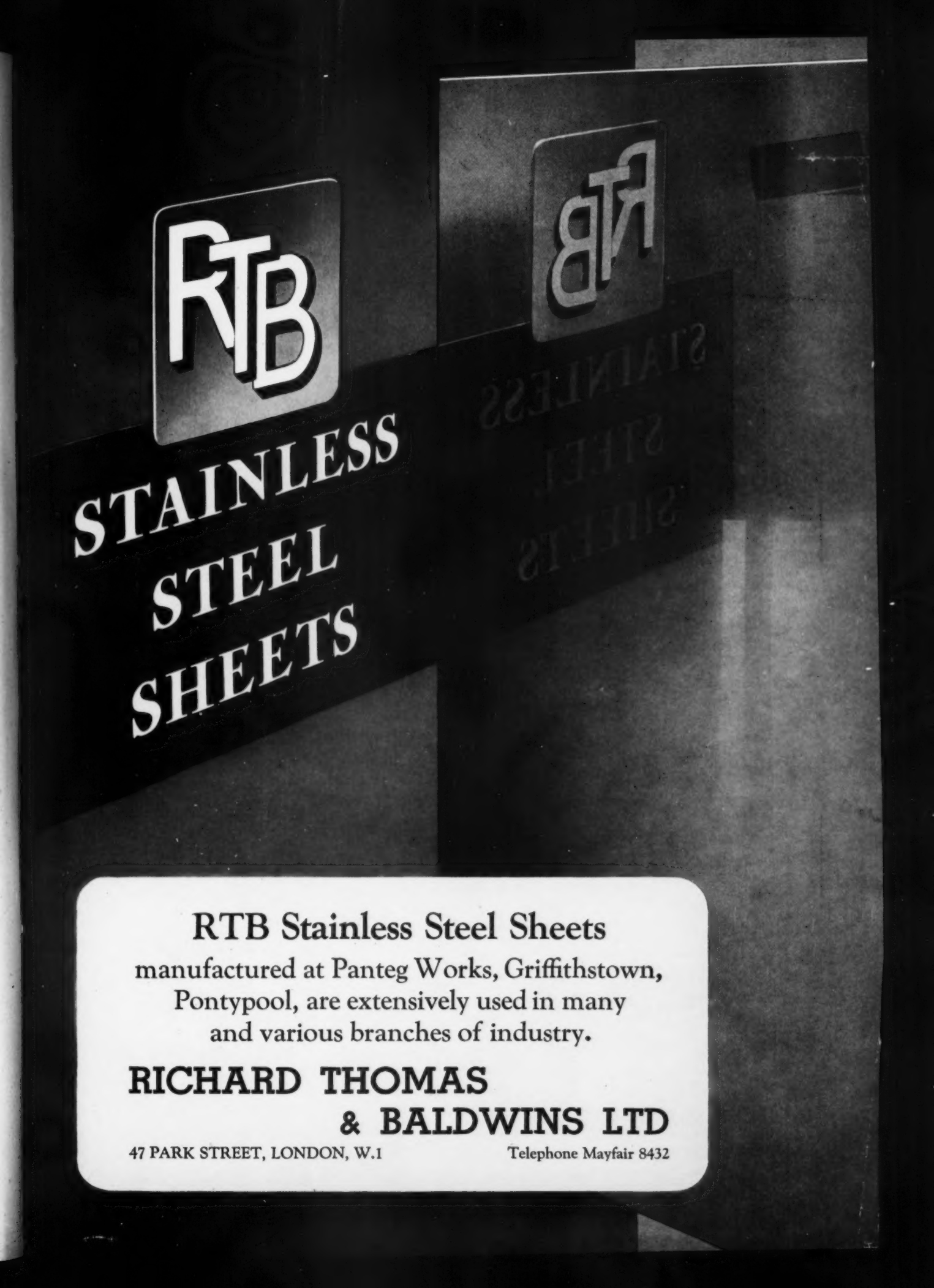

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